

The Iron Age

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An Improved Band-Saw.

The accompanying illustration represents an improved form of band-saw made by Goodell & Waters, of Philadelphia, which is especially adapted for pattern-making and cabinet work. It dispenses with the ordinary heavy iron base, and consequently with a large proportion of the weight and room occupied, and can also be made on this account much cheaper than the ordinary form without its efficiency being in any way impaired. Besides this reduction in the cost of the machine, the decreased weight also insures a greater economy in transportation and in setting up, the total weight of the machine complete being about 650 pounds. This saw can be attached to any size or shape of column, and will run with all the steadiness and accuracy of a heavier machine. It is often desirable to have a band-saw in a small room on an upper floor where it would be difficult, if not impracticable, to put a saw with a heavy frame. It is for such places that this machine is peculiarly adapted on account of its lightness and compact form, as it can be carried up an ordinary stairway by two men. The wheels, which embody quite a number of improvements, have hubs some 3 inches in length, with annular projections extending parallel to the axis on the periphery of the hub, through which a number of holes are drilled. The spokes, which are of $\frac{1}{2}$ -inch round iron, and threaded on each end, are screwed in these holes, as may be seen by reference to the cut. The spokes are held by nuts on each side of the annular projection, which arrangement enables the operator to true up the wheels if from any cause they get sprung. The wheel rims are made of six thin strips of wood glued together and covered with an endless rubber band in the ordinary manner, and are true up on the inside before the spider—i. e., hub and spokes—is put in. The uniform strain, expansion, contraction and sudden stress caused by chips getting between the saw blade and wheels is allowed for by a combination of weight and spring, which tends to elevate the hub of the upper wheel. The weight maintains a uniform tension, compensating for variations in length arising from temperature, while the spring, which is merely a heavy rubber washer about $\frac{1}{4}$ inch in thickness, regulates the tension of the saw in case of any sudden friction or strain. This combination is designed to save the machine from all sudden jars and the consequent breakage of the saw. The table is so arranged that it can be tilted to any desired angle within 45° . The makers claim that, notwithstanding its lightness of construction, it is fully as efficient as the larger and heavier band-saws.

The Generation of Steam.

At a meeting of the British Institution of Civil Engineers, on December 6, the second of six lectures on "Heat in its Mechanical Applications" was delivered by Mr. William Anderson, the subject being "The Generation of Steam and the Thermo-Dynamic Problems Involved." Mr. Anderson remarked that the source of our fuel supply was derived from the rays of the sun acting upon the earth ages ago. He pointed out that those rays were of complex structure, intimately bound together and yet capable of being separated and analyzed, and that it required over 1000 horse-power to separate 1 ton of carbon from the atmosphere in 12 hours; but that, in consequence of the enormous area of leaf-surface in which the decomposition took place, the action was silent and imperceptible. As soon as a law of definite chemical combination had been established, chemists began to suspect that the changes of temperature observed in chemical reactions were also of a definite kind, and that they were as much the property of matter as chemical atomic weights. In the last century Lavoisier and Laplace, and after them, down to the present time, Dulong, Despretz, Favre and Silbermann, Andrews, Berthelot, Thomson and others had devoted much time and labor to the experimental determination of the heat of combustion and the laws which governed its development. Messrs. Favre and Silbermann, in particular, between the years 1845 and 1852, had carried out a splendid series of experiments, by means of a calorimeter, which was illustrated by a diagram. The apparatus consisted of a gilt copper receiver, in which the substances tested were burnt by a jet of gas. This receiver was immersed in another vessel containing water, which again was protected by another vessel lined with swansdown. Thermometers of great delicacy were employed to determine the temperatures, and the whole of the apparatus used for generating the gases and for collecting the products of combustion was constructed with the utmost ingenuity and skill. Messrs. Favre and Silbermann adopted the plan of ascertaining the weight of the substances consumed, by calculations from the weight of the products of combustion. By this means they were enabled to deal with larger quantities, and several errors incidental to the opposite process were eliminated. A table was given showing the calorific value and the chemical composition of such substances as commonly formed the constituents of fuel.

The thermo-chemical laws relating to combustion and decomposition were then stated, and the general formula for calculating the thermic value of any kind of fuel whose analysis was known was explained. It was

pointed out that energy existed on the earth in a form which was often unsuitable for the wants of man. For example, the water flowing down the Alps was competent to furnish the power necessary for boring through those mountains, but it was not in a form which could be used directly. The kinetic energy of the water had first to be transformed into the potential energy of compressed air, and in that form it became available for the miners. In the same way the energy of combustion could not be applied directly to the wants of man. It had first to be converted into the form of steam or air at high pressure and temperature, and then, by means of suitable heat engines, it could be used in the manner with which all were familiar. It was probably to this circumstance that the tardy development of the steam engine was due, for its history dated back only some 200 years—a very small proportion of the time during which the human race had existed. A steam boiler was in reality a species of heat engine, and its action should be investigated upon the same principles, and consequently the doctrines of Carnot were applied. According to these, the efficiency of a boiler depended entirely upon the range of temperature through which the heated gases acted, and, by means of an illustration derived from an application of water-power, it was demonstrated that the proper way to increase the efficiency of a boiler was to raise the temperature of the furnace to the utmost degree possible, and to lower the temperature of the smoke to the lowest point practicable. Particular instances were then taken in which it was shown that 1 pound of carbon would be capable of evaporating 14.87 pounds of water from and at 212° F.

The case of the prize engine at the Cardiff show of the Royal Agricultural Society in 1872 was described in detail, and it was

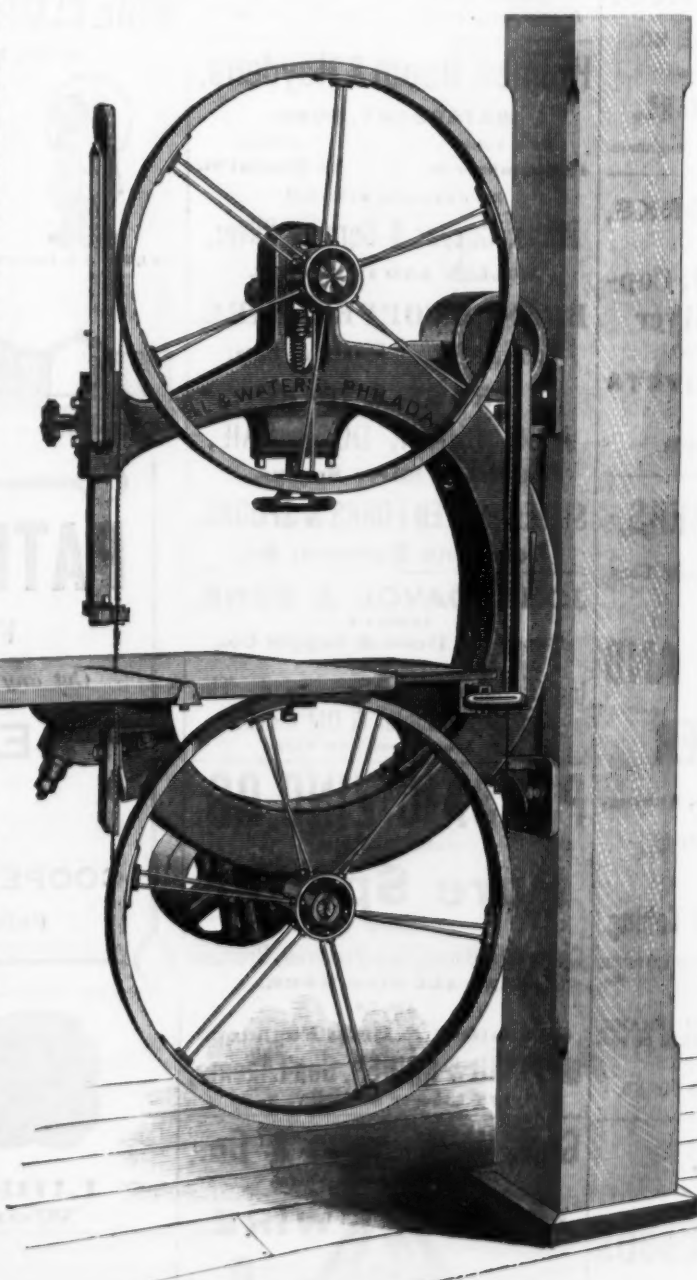
demonstrated that the maximum amount of work which could be expected from its boiler was equivalent to the evaporation of 13.27 pounds of water, the actual evaporation having been 11.83 pounds, showing a duty of 89 per cent. In pursuance of the idea of treating a boiler as a heat engine, an indicator diagram was exhibited and explained, and the laws of Carnot were stated in detail and discussed. The terms of Carnot's formula were then examined separately; first, in relation to the temperature of the furnace, the process of combustion was explained, and it was shown that the temperature of the furnace depended upon the supply of air. A minimum supply would give the highest temperature, but it was found necessary to add an excess in order to make combustion perfect. It was pointed out that the limit to high temperature in a furnace was the imperfection of the material out of which boilers were

constructed. It was shown, from the fact that the steel was capable of being melted in boiler furnaces, that temperatures so high as that were not injurious, but that, when the melting point of steel was exceeded, the boiler plates began to suffer severely. Next, the temperature of the chimney end of the boiler was examined. It was stated that, by the adoption of feed-water heaters and by the use of forced draft, not for the purpose of augmenting the steam production irrespective of economy, but with a view to promoting economy, the temperature of the smoke could be lowered to about 100° F. above that of the feed-water. The loss of 11 per cent. in the Cardiff boiler was then looked into, from which it appeared that it arose from radiation and convection from the body of the boiler, partly from imperfect combustion, which always prevailed more or less, and partly from losses incidental to the transfer of heat from substances less dense to others more dense, and vice versa. It was stated that this loss was common to all energy propagated by undulatory motion, such as light, heat or sound. The law of conduction through plates was then explained, and it was pointed out that even joints in a bar of uniform material interposed a certain amount of resistance, and the fact was illustrated by an experiment. The loss was

much greater when there was a joint between dissimilar materials, such as between the gases of the furnace and the boiler plate, and between the boiler plate and the water. At first sight it would appear a matter of common sense that a boiler which contained its own furnace must be a better generator than one with an external furnace formed of brickwork, but brickwork was an extremely bad conductor of heat, while it was a very good radiator, absorbing heat from the gases and returning them by radiation to the boiler surfaces. This action was strongly pronounced in the case of the reverberatory furnace and in the brick arches now commonly introduced into the fire-boxes of locomotives.

The gases forming the products of combustion were very bad absorbers and very bad radiators of heat. Pure dry air and nitrogen were absolutely incapable of absorbing or radiating heat. They were not in the least affected by the passage through them of the most intense heat rays. Carbonic acid was a somewhat better radiator, while the vapor of water

with such fuel as anthracite and coke, burning with very little flame. In the latter case tubular boilers were preferable, but, unless the combustion was perfect before the gases reached the small tubes, the gases cooled down so considerably that the flame was frequently extinguished. This fact was illustrated by an experiment which showed that when pieces of $\frac{1}{4}$ -inch gas-pipe of various lengths were placed over an ordinary gas flame, the shorter tubes allowed the flame to pass through, while the longer ones extinguished it, and the gas could be relighted at their upper ends. Water, being completely adiabatic, and a very bad conductor, could not be heated by direct radiation or conduction. The process of heating by convection was explained in detail, and a comparison was instituted between the heat transmitted from the hot gases in the furnace of a boiler to the water, with the reverse effect of warming by the transfer of heat from hot-water pipes to the air of a room. The two, being reverse operations, agreed very closely together in accordance with the theory of exchanges. The proper heating surface to be allowed in a boiler to effect a given amount of evaporation was then dwelt upon. The mode of calculating the sectional area of tubes and flues was given, the heat of the chimneys and their area was considered, and, finally, the thermodynamic theories relating to the formation of steam were investigated. It was stated that, of necessity, the molecules of steam which became emancipated from the water through the energy of heat carried with them particles of water, and that these particles constituted priming, the amount of which depended upon the velocity with which the steam escaped from the water. A table was exhibited of a large variety of boilers ranged in order of the velocity and disengagement of steam from the water surface, and from this it appeared that those in which the velocity was highest were also those most subject to priming. The doctrine of the viscosity of liquids and gases was next dealt with and applied to account for the manner in which particles of water and of very minute solid impurities were carried over from the water of the boiler into the steam. The same theory was adduced to show that, from the slowness with which smoke fell in the atmosphere, it must be composed of exceedingly small particles, and that they were not very numerous compared with the volume of the gases with which they were associated. It further went to show how it was that complete combustion did not produce any marked economy, because the absence of the white-hot particles of carbon from the gases caused a loss of radiating power. It was thought that no great improvement was to be expected in the economy of boilers, for the limit had been already almost reached. The honor of having first pointed out



AN IMPROVED FORM OF BAND-SAW.

(Goodell & Waters, Philadelphia.)

was a good absorber, and, therefore, a good radiator. It was then demonstrated that the products of combustion consisted mainly of air and nitrogen, and consequently, taken as a whole, the products of combustion were bad radiators. Little or no economical advantage was derived from making the combustion in a boiler perfect, because the colder luminous flame was a good radiator, on account of the white-hot particles of carbon it contained, while the hotter and non-luminous flame was a bad radiator and carried a great deal of the heat into the chimney. This circumstance was illustrated by an experiment, by which it was proved that an intensely hot non-luminous Bunsen flame had very little more effect upon an air thermometer than a smoky luminous flame burning the same quantity of gas, but that the moment a spiral wire was hung in the Bunsen flame it commenced to glow, and the radiation from the wire immediately had a powerful effect upon the thermometer. It was probably owing to this circumstance that the backwardness of the owners of steam boilers to prevent smoke was to be attributed. Had considerable advantage been obtained by the suppression of smoke, acts of Parliament would not have been necessary for the purpose.

A different class of boiler was required for consuming flaming fuel, as contrasted

the true principles on which the duty of boilers should be estimated—namely, by comparing the work actually done with the potential energy of the fuel used—was due to the late Professor Rankine.

Mr. H. Arnold, of Wilhelmshaven, Germany, has for some time past been conducting an interesting set of experiments as to the influence of sand on the strength of cement mortar. Six different kinds of sand were subjected to test, and the results showed that the strength of mortars similarly made with the same cement depends on the coarseness and size of the grains of sand, and that in sands of equal size of grain that is the best whose grain is the coarsest. In order to determine the influence of the size of the grain, comparisons were made with several specimens of sand of various sized grains, and also with granite chips, the result always being in favor of the latter. It was further found that coarseness of grain is a more important factor in the quality of a sand than the size of grain, and that sand containing uniform sized grains is not always the best. On the whole, however, Mr. Arnold concludes that, although different kinds of sand yield different results with similarly prepared mixtures of mortar, it will not be justifiable in ordinary masonry to alter the

prescribed proportion of cement and sand unless the exact quality of the sand employed is known.

SCIENTIFIC AND TECHNICAL.

A New Compass.

Among a number of improved forms of compasses which have of late been brought before the public is one invented by M. Mascart, the well-known electrician, who has devised a new compass which finds the magnetic meridian by the well-known experiment of moving a coil of wire across the lines of magnetic force of the earth and inducing a current in them. M. Mascart in the construction of this instrument employs an azimuth circle, on which is mounted a ring movable round a horizontal axis. The angle made by the ring with the horizon is measured off by a vertical circle, which is divided off by degree marks in the ordinary manner. A coil of .12 m. ($4\frac{3}{4}$ inches) in diameter is carried by the ring, and can turn round an axis perpendicular to that of the ring. The size of the apparatus is not greater than an inclination compass. It acts on the principle that when the axis of rotation of the coil is in the magnetic meridian the induced currents in the ring, when rotated, will be nothing. A sensitive galvanoscope is employed to show the induction currents. In using the apparatus, a series of trials show that the axis of the ring is perpendicular to the magnetic meridian. A second series place the axis of rotation of the coil in the line of the inclination needle. The observation, with checks, occupies half an hour, which is less time than is necessary to find the inclination by a magnetic needle. From observations made at the Observatory of the Parc Saint Maur, by M. Mourciaux, the new compass seems to be as correct as the inclination compass.

Elevated Electrical Railroads.

Judging from report, definite steps are now being taken to secure the introduction of electricity as a motive power on elevated as well as surface railroads. At the meeting of the Rapid Transit Commissioners recently held in New York, William F. Sherman, of Chicago, secretary and superintendent of the Chicago Elevated Passenger and Automatic Mining Railway Company, called attention to the fact that in Chicago there was in operation a sectional elevated railroad that had carried 50,000 people by electric motor. It had been running in the Exhibition Building for six weeks without accident; it had also been run by cable, and was so constructed that any motor could be applied to it. He asserted that the cost of construction was less than that of any other elevated road. A striking peculiarity of this method is that the car trucks are placed near the top of the car, on the sides, the body of the car hanging below, bringing the center of gravity below the center of support. The car wheels are double-flanged and have oscillating axles, which prevents friction when turning curves. The conducting wires and transmitters are entirely out of the way. If a wheel breaks there is no liability to accident, as the trucks are so constructed that a duplicate wheel takes the load without any depression of the car. On account of the manner in which the cars run—below rather than over the track—it is evident that there is no possibility of the car being derailed or coming in contact with any obstruction on the track. The cars can be run by electricity as fast as 100 miles an hour, or as slow as may be desired, and they can be stopped suddenly without jarring. Mr. Sherman exhibited maps and plans showing the construction of his elevated road and the application of the motive power to the cars, and he invited the commissioners to see the system in operation in Chicago at the Exhibition Building. The cars are practically noiseless, he said, the tracks being sunk in a wooden cushion, and the trestle possessing other peculiarities of construction tending to deaden sound. The cost of the elevated structure, double track, ready for the rails and cushions, would be \$74,000 per mile. He exhibited the prospectus of a proposed rapid-transit electric road in accordance with his system from Boston to San Francisco "in 36 hours." He stated that an act was to be introduced in the Massachusetts Legislature authorizing the construction of an elevated railroad on this system in Boston.

Women as Inventors.

Among recent inventions of importance by women, says a writer in the *North American Review*, are a spinning machine capable of running from 12 to 40 threads; a rotary loom doing three times the work of an ordinary loom; a chain elevator; a screw crank for steamships; a fire-escape; a wool feeder and weigher, one of the most delicate machines ever invented, and of incalculable benefit to every wool manufacturer; a portable reservoir for use in case of fire; a process for burning petroleum in place of wood and coal for steam-generating purposes; an improvement in spark arresters, to be applied to locomotives; a danger signal for street crossings on railways; a plan for heating cars without fire; a lubricating felt for subduing friction (the last five all bearing upon railroad travel); a slable type, with adjustable cases and apparatus; machine for trimming pamphlets; writing machine; signal rocket, used in the navy; deep-sea telescope; method of deadening sound

(Continued on Page 5.)

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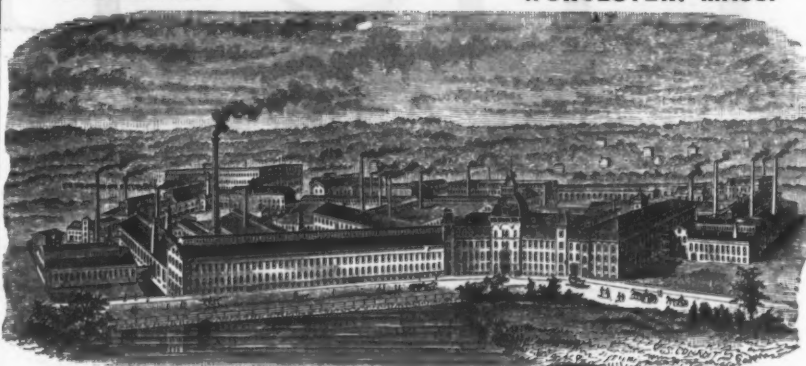
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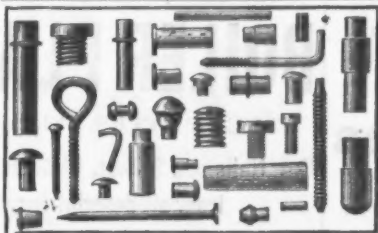
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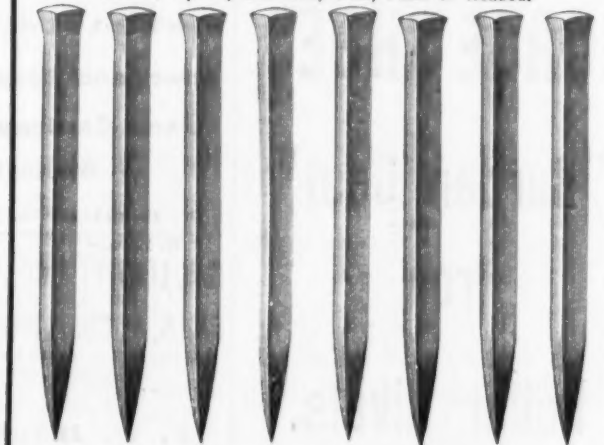
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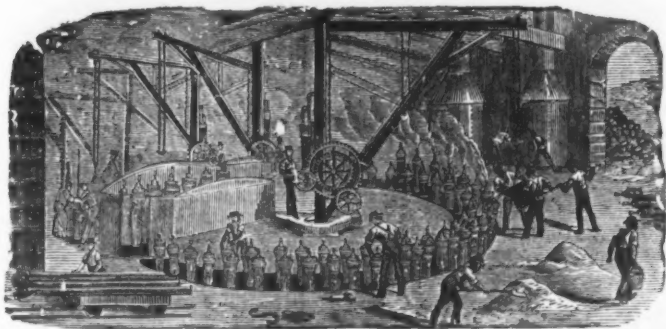
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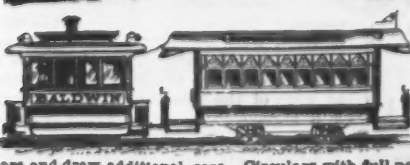
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The fact of the great strength and durability of this sink, as it is practically free from danger of breakage in transportation, handling or use, is a strong point in its favor, and that its merits are recognized by most competent judges is evident from the fact that leading houses which have been interested in the common article have taken up the Wrought Steel Sink. Twenty-five per cent. is saved in freight by purchasing Steel Sinks. Orders come from all parts of the United States, Canada, Europe and Australia.

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are kept in position and locked in the V-groove by the weight of the carriage, which, with its load, is suspended under the center of gravity during the passage. The four upper wheels have a crank-handle affixed, by means of which the passengers, seated back to back, can propel the carriage up the short incline at the termination of each journey. For 460 feet or thereabout the trip is accomplished by gravitation. The third rope introduced is placed at a lower level, under the center of gravity. It passes under a single pulley inside the carriage, close to its floor. This under-wire is strained up to sustain one-half of the prescribed load, and is equal in strength to both the upper ropes, the combined breaking strain of the whole being equal to 32 tons, according to the Admiralty test. Immediately on the third rope being strained up to its proper level, and the new carriage being put in its position, Mr. Harper, of Seaford, who has been intrusted by the Great North of Scotland Railway with the design and execution of the scheme, started for the opposite shore, which he reached in the short space of 40 seconds, returning with a passenger, against a strong pressure of wind, in rather less than a minute, without having to use any exertion, except in ascending the few feet of the incline as he approached his destination. The ropes are suspended from Scotch fir posts, the tops of which are 15 feet above the level of the river.

Iron Baths for Molten Metals.

With a view to effect saving in the wear of the baths for melting and containing the molten metal employed in the processes of galvanizing, tinning, lead coating and other analogous metallurgical operations, Mr. W. H. Luther, of Glasgow, has suggested some improvements, which, however, have not been patented. Hitherto, such baths have been constructed of the best malleable-iron plate or of steel; and in order to render the baths capable of retaining their shape and durability when containing many tons of molten metal, it has been necessary to employ iron or steel plates of considerable thickness, varying from 1 inch upward. With such thick iron or steel plates as hitherto used, further difficulties are involved in their construction, owing to the necessity of having special punching and bending machinery for the construction of the baths. Owing also to the action of molten metals on the iron or steel used, inferior classes of iron cannot be advantageously employed, for they are not durable, it frequently happening that a hole or rent is formed through the iron shortly after the bath has been in operation, giving rise to a considerable loss of metal. According to the present invention the baths are constructed of a double casing, the space between which may be filled with fire-clay or some such material, or the lining may be dispensed with, in which case the inner casing fits closely into the outer one. The inner casing is made of the best iron or steel plate, and of comparative thinness and preferably welded in place of riveted, while the outer casing may be made of the cheaper qualities of malleable iron, or of cast iron, which may be in one piece or riveted together. According to Mr. Luther's invention, when the baths of the ordinary kind are rendered unfit for further use from the causes mentioned they may, in place of being dealt with as old or scrap iron, be utilized as an outer casing to carry one of his improved inner casings. Another part of the invention consists in the employment of corrugated iron in the construction of the outer shell of the baths, by which great stiffness is obtained and thinner metal may be employed; the increased stiffness of the metal due to the corrugations will also allow of much larger baths being used than the ones employed in ordinary practice.

Failures in England in 1883.

Statistics showing the failures in England last year have been compiled by Mr. Richard Seyd, F. R. S. From these it would appear that there is a steady decline in the number as compared with previous years. We give below the totals for last year:

Years.	Failures.	Wholesale.	Retail.
1877	11,022	2,172	8,850
1878	15,059	2,643	12,416
1879	16,637	2,546	14,091
1880	13,147	1,478	11,669
1881	12,006	1,335	10,670
1882	11,019	1,314	9,705
1883	10,509	1,261	9,248

In the wholesale and manufacturing trades the failures were as under:

	For the years—		
	1881.	1882.	1883.
London.....	313	350	377
Liverpool.....	47	48	59
Manchester.....	64	52	82
Lancashire.....	88	86	88
Yorkshire (not including Middlesboro' and Hull)	197	211	215
Birmingham and Midland Iron District.....	145	94	109
Newcastle, Middlesboro', Hull and district.....	54	42	47
Bristol, Cardiff, Newport and Swansea.....	41	30	37
Provinces.....	259	259	282
Scotland.....	97	78	63
Ireland.....	30	15	16
Total.....	1,325	1,314	1,361

These figures, on the whole, are considered favorable, though in some lines of business and in certain districts they show anything but a healthy state of affairs.

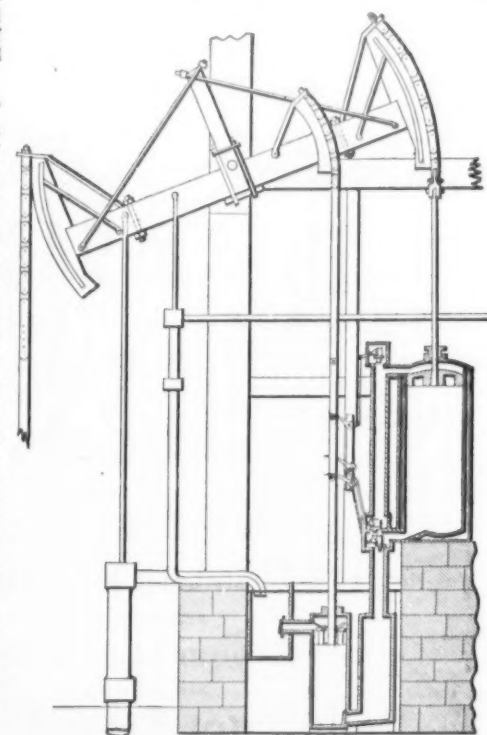
The patent right in a machine for separating straight from crooked wires has been assigned to the Morse Twist Drill and Machine Company, of New Bedford, Mass. It is designed more particularly to the sorting of such wires used as blanks in the manufacture of cutting and boring tools. The blanks are passed, while in rotation, between two parallel plates, the distance between which is equal to the diameter of the wire. When the wire is so caused to rotate it will, if it is straight, show it by rotating uninterruptedly. If it is bent, it will be caught at some point of its rotation.

The Inventions of Watt.

BY EDWARD A. COWPER.*

It is generally known that James Watt left a number of models of various kinds, some at his house, Heathfield Hall, Handsworth, near Birmingham, and some at his works, Soho, near Birmingham, but no general description has appeared of them, and as no explanation or description is appended to them, it is necessary to "read" their meaning after careful examination and comparison. This has been attempted by the author, who also suggested that, as many of the Watt models at South Kensington had got the dry-rot and were very badly worm-eaten, drawings and photographs should be taken of them by the Institution, so that a perfect record of them might be obtained before they were entirely destroyed.

The Department of Science and Art at South Kensington very kindly entertained the idea of photographing such models as it was useful to photograph, and have very liberally presented copies to our Institution. Col. Stuart Wortley (the curator of the Patent Office Museum) also kindly allowed particulars to be taken of the parts of Watt's engine and other machines which are in that



Watt's Inventions.—Fig. 1.—Model of Early Pumping Engine, 1769.

museum. Mr. George Tangye, one of our members, has very kindly responded to the author's request to have photographs of the two important machines in the "Watt Room," in Heathfield Hall (now inhabited by Mr. Tangye), and he has had photographs taken of a number of other interesting articles and tools, including Mr. Watt's own lathe, workbench, tools and old apron, as selected by the author, who had the pleasure of spending parts of two days in inspecting everything in the room carefully, and of sleeping a night in the old house. Mr. Tangye has very liberally presented these photographs to the Institution, and our council, in the interest of the members, has had drawings and diagrams made under the author's direction to illustrate the several models and inventions.

It has been found necessary to make a selection from the mass of information so obtained, and it is proposed to engrave and print the greater portion for the use of the members. In some cases the models are

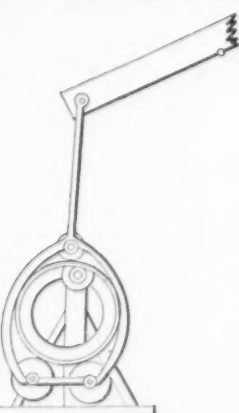


Fig. 2.—Eccentric, with Rollers.

simply duplicates of others, slightly varied in form, but the most important of them are included in the following list:

1. Early pumping engine, 1769.
2. Surface condenser, 1769 (tubular).
3. Disk with crank-pins, 1781.
4. Eccentric, with rollers on connecting-rod, 1781.
5. Sun and planet engine, 1781.
6. Sun and planet motion, internal gear on rod, 1781.
7. Ladder motion, 1781.
8. Ladder motion, with two guides, 1781.
9. Sun and planet, with groove, 1781.
10. Sun and planet, with internal gear on shaft, 1781.
11. Winding gear, with cam, 1781.
12. Vacuum indicator, 1782.
13. Balance-wheel rotative engine.
14. Whole power figure.
15. Friction figure.
16. Cylinder, with indicator diagram, 1782.
17. Double action engine, 1782.
18. Bull engine, 1782.
19. Beam engine (double acting), 1782.
20. Rolling and slitting mill, 1784.
21. Rotary steam engine.
22. Semi-rotary steam engine.

* Paper read before the Institution of Mechanical Engineers at Birmingham, England.

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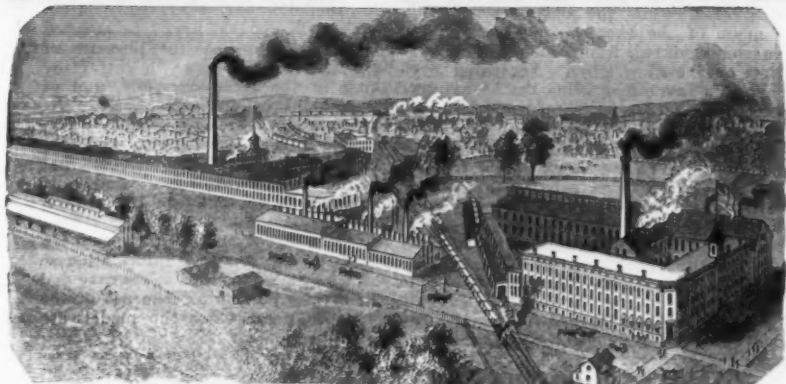
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Drill,
Feather Edge,
Finishing,
Flat,
Flat Equaling,
Flat Wood,
Gang-Edger,
Ginsaw,
Gulleting,
Half-Round,
Half-Round Wood,
Hand,
Hand Equaling,
Handsaw Blunt,
Handsaw (Double-End),
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Handsaw Taper, double-cut,
Handsaw Taper, slim,
High Back,
Hook-Tooth,
Knife,
Knife Blunt,
Lead Float,
Lightning,
Machine Mill,
Mill,
Mill Blunt,
Mill Pointing,
Pillar,
Pitsaw,
Reaper,
Roller,
Round,
Round Blunt,
Slotting,
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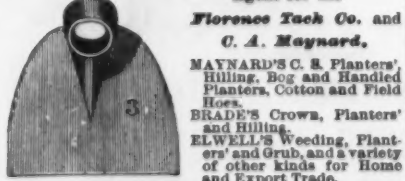
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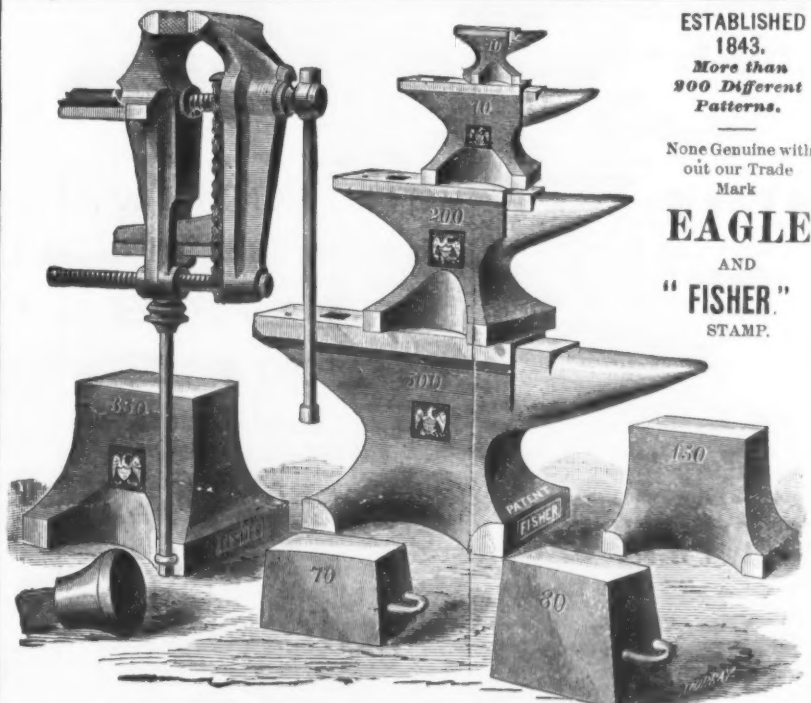


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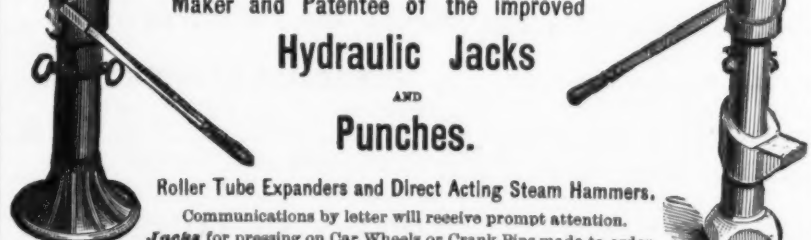
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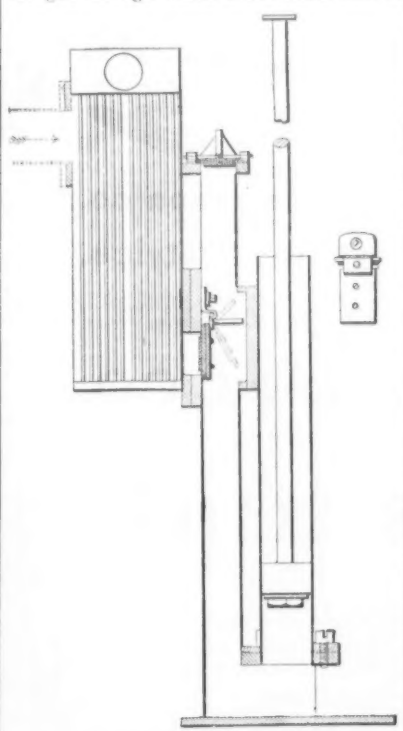
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23. Hammer.
24. Unfinished model of cylinder.
25. Counter, intermittent (no diagram).
26. Counter, geared, 1817.
27. Grinding machine.
28. Pulverizer.
29. Copying press, with rollers, 1750.
30. Copying press, with screw, 1780.
31. Wedges.
32. Copying machine for sculpture.
33. Trussed frame for copying machine (no diagram).
34. Reducing machine for sculpture.

At the risk of commencing a description of the inventions of James Watt with a thrice-told tale, the author feels bound to take into account, to some extent at all events, the sequence of the inventions of the great man whose works we are endeavoring to decipher. It is sometimes a matter of intense interest to any one who has attempted to improve a machine, to realize the process of thought through which a successful man of



Watt's Inventions.—Fig. 3.—Tubular Surface Condenser, 1769.

science and practice has arrived at his conclusions, and his triumphs over the elements, as in this case, where literally earth (metals), air, fire and water have been pressed into the service of man as much as any "Jack Tar" was ever pressed into Her Majesty's service to fulfill a given duty. The author is obliged to refer to such history as is available, and finds that Watt's patents are probably the most reliable for the dates of his inventions. Many of the models agree with the patent drawings, but there are some models not shown in the patents and some drawings of which there are no corresponding models.

Now, Watt's first patent of 1769 clearly lays it down (in his own words) that the working cylinder, or "vessel," as he chose to call it, was to "be kept as hot as the steam that enters it, first, by inclosing it in a case of wood or any other materials that transmit heat slowly; secondly, by surrounding it with steam or other heated bodies, and, thirdly, by suffering neither water nor any other substance colder than steam to enter or touch it during the time." The author may perhaps be pardoned for observing here that it is extraordinary that there should ever have been any doubt in the minds of engineers, since the time of Watt, as to the advantages of steam-jacketing any cylinder that would otherwise be exposed to cooling influences, for the effect on the indicator figure obtained is very marked, as he has before had occasion to observe; indeed, engines of the most economical construction cannot be made without steam-jackets. Watt's first patent has no drawings, but in his second patent the steam-jacket is distinctly shown.

Now, we must just bear in mind that up to this time the pumping engines that were then at work were Newcomen's, and that the practice was to let the steam into the cylinder under the piston, to allow it to go up, by means of the weight of the pump rod, &c., at the other end of the beam, and then to condense the steam in the cylinder, by allowing a jet of cold water to play into the cylinder, thus in time forming a partial vacuum,

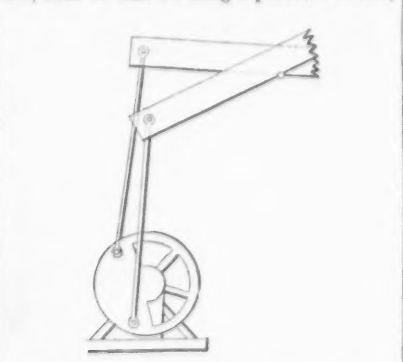


Fig. 4.—Disk with Crank-Pins, 1781.

and causing the piston to come down by the pressure of the atmosphere on the top of the piston, while great leakage of air past the piston was prevented by the fact that there were several inches of water on it. The cylinder, of course, was very considerably cooled by the operation. There was no air-pump to such engines, but when the piston had made its down stroke or "gone indoors," there was the condensing water and condensed steam, with what air there might be, in the cylinder; then, instead of all this being taken out by an air-pump, it was expelled, through a small valve called a "snifting-valve" at the side of the cylinder, close to the bottom, by the fresh steam when it

was admitted to the bottom of the cylinder to let the piston go up again. Such engines could, of course, only work very slowly, as the cylinder had to be heated up a good deal before the steam would fill it.

The author is sorry to say that the old pumping engine first made by James Watt and used at Soho for pumping water up into Soho Pool, to be used on a water-wheel there, has not been preserved; it was ruthlessly thrown away on to the scrap heap when dismantled, to make room for a larger engine, viz., "Old Bess," as it was called, which the author well remembers seeing as a lad. His late friend, Mr. Bennett Woodcroft, who had charge of the Patent Office Museum, did all he could to obtain some portions of the first engine, but failed. He was a man who would have done much more for science had he not been greatly hampered in his work, but it is to be hoped that the Patent Office Museum will in future be the receptacle of many good models of successful inventions, and be, in fact, a museum of reference.

But to return to the history of the inventions we are following. Watt says in a very few but distinct words that the condenser "ought to be kept cold" "by application of water or other cold bodies." He does not say by injection of cold water, neither does he say in words by surface condensation, but it is clear that if the condenser is "kept cold" by the application of cold water outside of it, it is in fact a surface condenser, and some books state that he held on to the idea of surface condensation, and persevered in it to a considerable extent, until his condensers got rather unmanageable in size. It will presently be seen how he met this difficulty by an excellent surface condenser, but it is certain that he gradually used more and more injection as a matter of practice. It is a curious fact that Watt's most important patent, viz., his first one of 1769, has no drawings at all attached to the specification, but his claims are very clearly stated.

With regard to maintaining a vacuum in the condenser, as every cubic foot of steam takes over a cubic inch or more of air, and as Watt had no "snifting-valve" like Newcomen's, he required something to take out such air as entered his condenser, together with the injection water, if any, and the condensed steam; and he says very shortly, "Thirdly, whatever air or other elastic vapor is not condensed by the cold of the condenser, and may impede the working of the engine, is to be drawn out of the steam vessels or condensers by means of pumps wrought by the engines themselves or otherwise." Thus we have the beautiful invention of the air-pump to maintain the vacuum in an engine by removing the air.

Fig. 3 is a drawing of perhaps one of the most interesting models of the whole collection, next to those showing the condensation of steam in a separate vessel or condenser by means of an injection of cold water, as this model shows the condensation of steam in a separate vessel, or surface condenser, composed of a large number of small vertical tubes with the cold water in them and the steam outside them, which is the best arrangement. It is provided with an air-pump. There are 139 small vertical tubes, and if they are taken to represent tubes about 3/4 inch in diameter, they would be about 5 feet long. They are, in the model, soldered into the tube-plates at top and bottom. One very remarkable thing about this model, which was suspected by the author before the model was taken to pieces, is that the vertical air-pump has a valve in it,

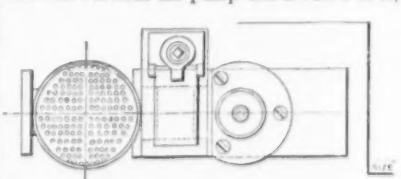


Fig. 5.—Top View of Surface Condenser (Fig. 3).

and is worked very much in the same excellent manner that our best horizontal air-pumps of marine engines now work, viz., to move (or "see-saw") the water from the inlet valve up to the delivery valve, thus insuring the delivery first of all of the air on the top of the water, and then of the water that has to follow the air, so that no air may be left in the air-pump. It is to be wished that all modern air-pumps were made as perfect in their action as this one. This is a remarkable case of a first inventor making an apparatus almost perfect at once, though Watt did not make many of these surface condensers, probably from the expense attending them. Then follow, in the 1769 patent, clauses for a high-pressure engine to work without a vacuum when water is scarce, the steam being discharged into the open air after it has done "its office." It is certainly to be regretted that Watt never followed up the use of high-pressure steam, as no doubt he would have accomplished much more and have made more powerful engines in smaller compass; but he left a great deal of this to Trevithick to accomplish, though he objected strongly to Trevithick or Bull using a separate vessel for condensation. In this first patent Watt had other claims for a kind of rotary steam water-wheel, also for a calorific engine, and for using "oils, wax, resinous bodies, fat of animals, quicksilver and other metals, in their fluid state, to make pistons air and steam tight, but we have no models of such schemes. Many of his letters prove that he used oil on the piston and pumped it up to use over again, and then he complained that a quantity went away with the condensed steam and was lost. Some piston packings were of pasteboard, soaked in oil and baked, and some of cork; but they did not follow the bad cylinders well, and it would seem to us now that it was a pity he did not insist upon having a good cylinder, truly bored out, much earlier. It is worthy of note that in a letter to a friend he said that he thought he had got his cylinder bored so perfectly that you could not get half-a-crown between the piston and the cylinder anywhere. Now, we must not be altogether surprised at this remark, when we consider with what materials he was in the habit of making his models. He used tin cylinders and soldered joints in many

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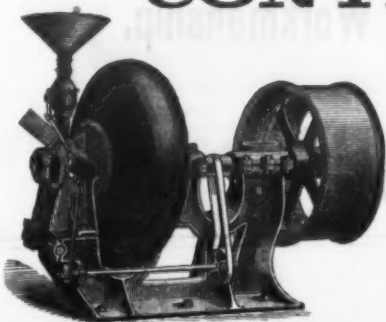
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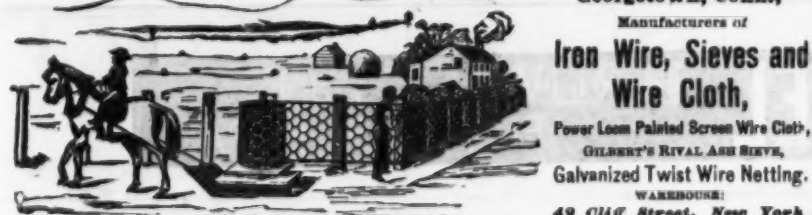


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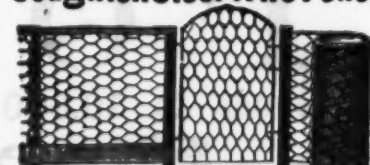
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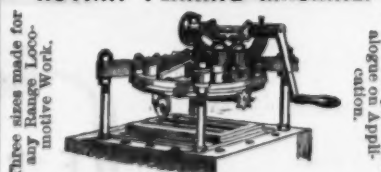


Sedgwick Steel Wire Fence



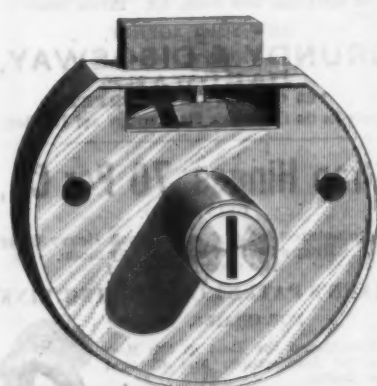
Is the only general purpose Wire Fence in use, being a Strong Net-Work Without Barbs. It will turn dogs, pigs, sheep, and poultry, as well as the most vicious stock, without injury to either fence or stock. It is just the fence for farms, gardens, stock ranges and railroads, and very neat for lawns, parks, school lots and cemeteries. Covered with rust-proof paint (or galvanized) it will last a lifetime. It is superior to Barbed or Barbed Wire in every respect. We ask for a fair trial, knowing it will wear itself into favor. The Sedgwick Gates, made of wrought-iron pipe and steel wire, defy all competition in neatness, strength and durability. We also make the best and cheapest All Iron Automatic or Self-Opening Gate, also Cheapest and Heaviest All Iron Fence. Best Wire Wirecutter and Post Auger. Also manufacture Russell's excellent Wind Engines for pumping water, or geared engines for grinding and other light work. For prices and particulars at hardware dealers, or address, mentioning paper, SEDGWICK BROS., M'rs., Richmond Ind.

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New Descriptive Catalogue on Application.
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PEDRICK & AYER, PROP'RS,
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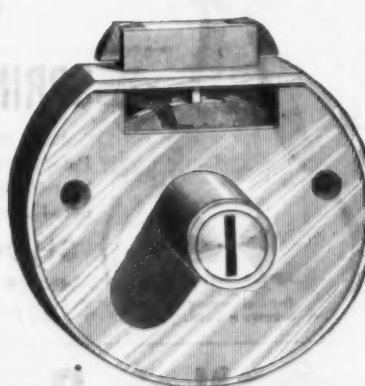
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AND
BOX LOCK.

All Brass. Finely Finished.



Full Size Nickel-Plated Flat Steel Keys.



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EITHER RIM OR FLUSH, RIGHT OR LEFT HAND.
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cases, and in one letter he says the cylinder was not very true, as it had not been bored, but was hammered; and in another letter he says that he shall in future make his cylinders of copper, as though that was a great improvement upon the material he had been using.

He speaks of his "White Iron Man," who was so useful, being dead, meaning his "Tin-Man," but it does seem sad that a block-tin cylinder that he used, 18 inches in diameter and $\frac{1}{4}$ inch thick, should be $\frac{3}{4}$ inch out of truth, and he speaks of trying to improve it by hammering it with a mallet outside, on a piece of wood fitted to the inside. It is curious to think of an optician and mathematician spending time over such imperfect work. His partner, Boulton, one day writes to Watt, who was away, that he had put in hand a block or boring head, to bore a cast-iron cylinder then in hand, probably one 7 $\frac{1}{2}$ inches in diameter. However, it does not do always to think lightly of others' work, unless we are sure of our ground ourselves. It is possible that there may be a few present who are not aware that if any ordinary cast iron cylinder of good size is bored horizontally, it is not fit to be used vertically, or vice versa, as it springs very perceptibly out of round with its own weight, independently of the strains of any chains that may be used to fix it while boring. This was tried by the author in 1845, and again lately, and it is evident that different parts will spring differently, according to their stiffness and size of flanges, &c. Fig. 1, taken from "Stuart's History of the Steam Engine," is in fact one of Watt's earliest pumping engines, single-acting, without a fly-wheel or any rotary motion, but with steam jacket to keep the cylinder warm, and a separate condenser to condense the steam without cooling the cylinder; with an injection-pipe and an air-pump, but no parallel motion, there being segments on the ends of the beam, commonly called "horse-heads" in those days. Now, an open-topped cylinder is shown in his 1781 patent, and a stuffing-box to the cylinder-cover in his 1782 patent; but it appears from Watt's notes to Robison's article on steam and steam engines, written for the "Encyclopædia Britannica," that Watt, even by 1774, had closed the cylinder at top, and put a stuffing-box for the piston-rod to pass through. The useful effect of so doing in a single-acting pumping engine is to exclude the atmospheric air from the cylinder, and let the steam act on the top of the piston when there is a vacuum below the piston and it is making its stroke "indoors;" then, when the piston is about to rise or go "outdoors," the steam on the top of the piston is allowed to pass to the bottom through a valve, called the "equilibrium valve," and when the piston has risen, this steam is let out into the condenser, and fresh steam is allowed to flow on to the top of the piston. In this way the cylinder never has any air admitted inside it. This was a grand improvement on Newcomen's engine, for less steam was required to do a given duty in pumping, and the engine could be worked much quicker, as no time was lost in heating up the cylinder and cooling it down again to obtain a vacuum. The time required for a stroke was simply the time the steam took to flow through the passages and the water to move through the pump. A noticeable feature in most of the models is the absence of anything like a large condenser or separate "vessel" for condensation, as in most cases the injection-pipe is shown throwing its water up the eduction-pipe, so as to meet the steam coming from the cylinder to the air-pump, thus making the pipe itself into the condenser. In Watt's patent of 1781 a number of very ingenious contrivances for converting the reciprocating motion of the piston into a continuous rotary motion are shown and described, though it must be at once freely admitted that none of them are so good as a common crank.

It appears that a man of the name of J. Pickard in 1780 took out a patent simply for the one object of converting reciprocating to rotary motion in a steam engine by means of a crank, and it has been said (but the author cannot say with what truth) that he was a workman of Watt's, who learned that Watt had invented such a mode, and then went himself and patented it; it has further been said that Watt would not attempt to make any terms with the man, and would not run the risk of a lawsuit. However, in the specification to the patent of 1781, Watt shows both a single crank and two cranks at right angles, having connecting-rods to them to enable the two engines to work on one crank-shaft. These cranks are pins in disks, and are not called cranks in the specification, but "points of attachment of the connecting-rods;" this would seem to be a distinction without a difference. See Fig. 4.

The model now exhibited is a model of an engine made according to Watt's patent of 1781; it is single-acting, and has an open-topped cylinder with air-pump, condenser and heavy balance weight on the connecting-rod, to give the impulse in one direction, while the piston at the other end of the beam gives the impulse in the other direction by means of the vacuum then produced in the cylinder, thus obtaining rotative motion. This model has been kindly sent here by Mr. E. B. Marten for exhibition. The next best plan is the well-known "sun-and-planet" motion, in which a spur-wheel, rigidly fixed on the connecting-rod, gears into a spur-wheel on the engine shaft, and is kept in gear with it by a pin or roller behind the center of the pinion, running in a circular chase or groove provided for it. Another plan of keeping the wheels in gear which has often been adopted is that of a link having one end turning freely on the engine shaft, while the other end confines the center pin of the spur-wheel fixed on the connecting-rod. The author has had to make some alterations in one of these engines within a very few years; it is only a "stand-by" engine, but is occasionally worked, and goes very well when the mortise pinion has been recently re-gear. Of course, the engine shaft goes double the speed of an engine with a crank. An actual engine of this type is now preserved at the Patent Office Museum.

Another form of "sun-and-planet" motion is one in which the "planet" spur-wheel is an internally-gear wheel, and is kept in gear by means of a roller at the lower end of the connecting-rod, running around an oval-shaped cam or guide-block. Another model

shows a "spur planet" on the connecting-rod, and internal gear on the shaft. Then there are two forms of eccentrics on shafts, one a solid one, with an eccentric-rod embracing it, but provided with rollers to bear against the eccentric to reduce friction, Fig. 5, and the other a hollow eccentric, with the end of the eccentric-rod fitting inside it, but provided with a roller to reduce friction.

(To be continued.)

Separating Rhea Fiber.

A number of machines have been patented in England for the separation of rhea fiber, so that it might be used in the manufacture of textile fabrics. The latest and most approved form of these machines is the invention of a Mr. H. C. Smith, and consists of an iron framing about 3 feet high, 2 feet wide and 3 feet deep from front to back, carrying a revolving drum about 18 inches in diameter and 12 inches wide. The drum is fitted with a series of beaters which pass near to the edge of a small feeding table about 12 inches wide, the drum being covered in with an iron hood. From beneath the feeding table a thin sheet of water is made to play in a constant stream against the drum at a certain pressure and angle, and this constitutes the whole of the apparatus. The fibrous plants are fed in by hand on the feeding table, and are simply held up to the beaters by a cushion or backing of water, by which means the whole of the extraneous matter is removed and the fiber produced in a remarkably short time and in excellent condition.

The machine was invented about a year ago, and some specimens of it have been made and sent to India, where they are now doing good work upon various kinds of fibrous plants. It does not, however, appear to have hitherto occurred to any one to try the effect of the machine in preparing the fiber of the rhea plant. This was probably on account of the woody nature of the rhea stalk, which, it might be assumed, would cause damage to the fiber if the stalk were beaten in a machine running at a high velocity. Not long ago, however, the machine was tried with rhea stalks, with the most satisfactory results.

The experiments consisted primarily in the treatment of some rhea grown in England, as well as other stalks of rhea grown in France. It should be observed that in practice the rhea should be treated freshly cut and in its green and juicy condition. In the present instance, however, the English stalks were cut on the 30th of October, and although they had been, as far as possible, preserved green, they were not, of course, in a condition to justify the expectation of the best results. Nevertheless, they were all successfully treated, the fiber coming out much better than had been anticipated. In one of the tests 115 stems of the French rhea were treated by the operator, and the fiber produced clean and free from all adherent particles in 3 $\frac{1}{4}$ minutes. Besides the foregoing, several varieties of fibrous plants were put through the machine, including the *Fourcroya gigantea*, an India aloe, the *Sonchecia Zeylandica*, or bowstring hemp, as it is called by the natives, the yucca and the *phormium tenax*, or New Zealand flax. All these were successfully treated, and considering that none of them were freshly cut, and that, moreover, they were garden specimens of the various species, the fiber left the machine in a clean and satisfactory condition. On the whole, it may be reasonably assumed that the problem of the mechanical preparation of rhea fiber has been solved, and that the prospects of the utilization of this valuable, but hitherto useless, plant are now fairly established. The invention is at present in the hands of Mr. C. E. Collyer, of 141 Fenchurch street, London.

Progress of the Basic Process.

During the last year the progress made by the Thomas-Gilchrist process, says the *Iron-monger*, has been fully maintained, both in England and on the Continent. In England the Northeastern Steel Company, Middlesbrough, commenced in last June with four 10-ton converters, and are now fully at work, regularly producing both rails and soft material, of which the average composition is: Carbon, from .12 to .15 per cent.; sulphur, under .05 per cent.; phosphorus, under .04 per cent.; manganese, under .4 per cent., with a tensile strength of 54,000 pounds, and an elongation of 24 per cent., the scrap from which is piled up either by itself or in admixture with iron scrap. In addition to rails, the basic steel has been largely employed for the production of soft material for conversion into plates, sheets, tubes, sleepers, angles and wire, which latter, from its great purity, has been employed for electrical purposes. The total output of Thomas-Gilchrist Bessemer and Siemens steel for the year ending September 30, 1883, was 634,373 tons, of which the different countries contributed as follows: England, 122,380 tons; France and Belgium, 67,106 tons; Germany and Austria, 410,952 tons; other countries (including America), 34,835 tons. The make for the month of October last is estimated at about 64,000 tons.

Explosion in a Coal Mine.—An explosion occurred at 8 o'clock on the morning of January 24, in the coal mine of the Colorado Coal and Iron Company, at Crested Butte, Gunnison County, Col., by which some 60 miners lost their lives. There were 67 men in the mine at the time of the explosion. Of these, 11, who were just entering, were thrown back by the force of the explosion, all being badly injured. The explosion was of such force as to wreck the engine-house, which stood fully 100 feet from the entrance to the mine. The accident is supposed to have been caused by a disobedience of orders by one of the miners. The mine carpenter, having discovered that there was gas in one of the chambers, ordered the men not to go into it. Immediately after his coming out the explosion occurred, and it is believed that one or more of the men must have ventured into the mine with lights.

The Baldwin Locomotive Works, of Philadelphia, have recently closed contracts, we understand, to furnish 120 locomotives to Russian railways.

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Manufacture the Largest Variety of Forge Carriage Irons, of Best Material and Workmanship.

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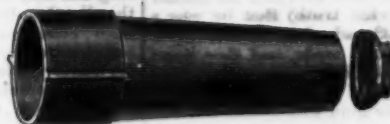
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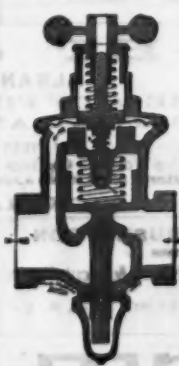
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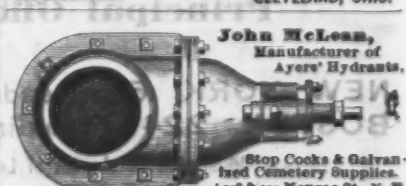
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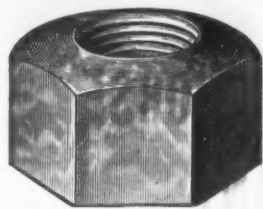
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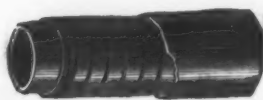


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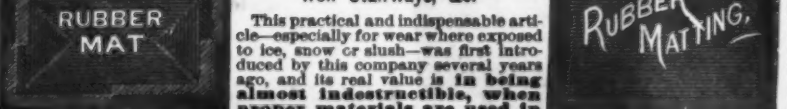
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Pat. 11,208, 213,601

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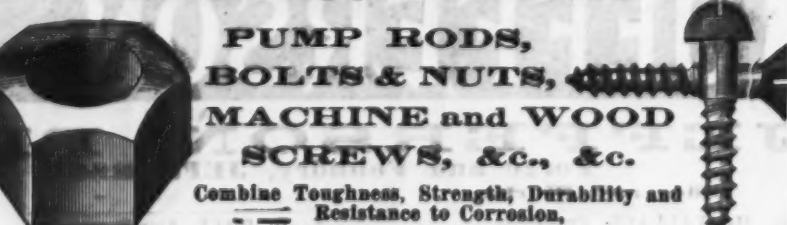
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REPORT ON THE MANUFACTURE OF GLASS. By Jos. D. Weeks. Size, 12 x 9 1/2 inches; 114 pages; published by David Williams. Price, \$2.50.

This work, though necessarily in great measure of a special nature, since it relates to but one of the many industries in the United States, yet contains a mass of statistics and general information which is of great value to all who are interested in the condition of the manufactures and the prosperity of the producing classes. The book in question, which was compiled for the Census Bureau, gives a very complete synopsis of the glass industry in this country, it being supplemental to—or, rather, a fuller report than—the one published in 1881. The tables given in the first chapter of the work contain all the important data relating to the glass factories in each and every State, and the statistics referring to their condition in the year 1880. The next seven chapters give very fully and in considerable detail the chemical composition of the various glasses, the sand alkalies and other material used in their manufacture, the furnaces and apparatus employed, and the methods of glass-making, including processes of melting and the manner of fashioning special forms and producing peculiar kinds. The remainder of the work is devoted to a history of glass and its manufacture, both ancient and modern. Under this head it may be noticed that the author ascribes the invention of glass-making to the Egyptians, and intimates that it was probably the slags formed in some metallurgical operation that first drew attention to the subject. The total value of the glass produced in the United States in 1880 is estimated at \$21,000,000, Pennsylvania leading with 78 works and an output valued at nearly \$9,000,000.

MECHANICS. By John W. Nystrom. Size, 9 3/4 x 6 1/4 inches; 511 pages. Published by Messrs. J. B. Lippincott & Co. Price, \$3.50.

The seventeenth edition of Mr. Nystrom's pocket-book, which for years past has taken a prominent position in that class of literature, has just reached us, and, besides the usual quantity of interesting and valuable matter, contains some important additions. Among the matter which has been added is that relating to the standard pitch of gear-wheels, with a table by means of which the correct pitch and diameter and the pitch-line for any number of teeth between 6 and 245 can be found by one single multiplication. It is known that the pitch should be measured in the chord, and not in the arc of the pitch-circle, for which the tables of circumferences for calculating the pitch and diameter of the gearing will not answer. The subject of belting and cone pulleys is treated very extensively, occupying seven pages, and embraces a handsome engraving. The formulae for belting are new, and claimed to be absolutely correct. The new belting table gives at a glance, without calculation, the proportion of the motive force, pulling tension and the pressure in the journals for any angle of contact of the belt on the smallest pulley between 60° and 250°. The article on cone pulleys is substantially the same as that which was published in Vol. I of *Mechanics*. The table of simple elements on page 470 gives both the old and the new equivalents, together with brief descriptive remarks relating to each one. The formulae for binary compounds are given, with their new equivalents, and are similarly treated as regards other points. Throughout the pocket-book improvements and corrections have been made, and there can be no question that in its new form it will meet with even greater favor than that which it has received during the past.

ELECTRICITY AND ELECTRICAL ENGINEERING. By Lieut. Bradley A. Fiske, U. S. N. Size, 6 x 9 inches; 370 pages. Published by D. Van Nostrand. Price, \$2.50.

Lieutenant Fiske's work, a copy of which reached us a short time since, is designed to form a bridge between the many works on the theory of electricity and those of its practical application. The relation of the two has been made difficult to understand, because the theory was studied from books devoted wholly to abstruse questions, and the practical application from books devoted wholly to that purpose. Explanation of the theory of the practical applications has been the end aimed at by the author. The book comprises 28 chapters, treating of frictional electricity, voltaic batteries, storage batteries, thermoelectric batteries, electrical measurements and all other branches directly connected with the subject. Throughout the work the author has attempted—and has to a great extent succeeded—to present the matter in an exceedingly simple and attractive form, and the average reader will find it instructive and valuable in many respects. Quite a good deal of matter has been taken from the leading electrical journals, the cuts in many instances coming from the same source, and in others being those of manufacturers of electrical appliances. An exceedingly interesting chapter is devoted to electric railways, describing the two general systems of electric propulsion, and giving a number of single and double page engravings of the different electric railways now in operation.

Chinese Progress.—From a commercial standpoint, as well as to some extent from a political point of view, says the *Ironmonger*, some jottings just to hand from one of our correspondents in China are of considerable interest. It is now about five years since the first 40-pounder gun was turned out at the Kiangnan arsenal, near Shanghai. In the interval a large number of 40, 50 and 120 pounders have been manufactured there, and still larger guns are said to be in contemplation. It is understood that the whole of these cannons are constructed upon Sir William Armstrong's coil system, the work being done on the spot by native workmen with only one European superintendent. The raw materials are all received from England at present, but there are good reasons for believing that no long time will elapse before the native materials will be used—just as the fuel is already raised from the native coal pits. The Chinese workmen make singularly adept mechanics, and are turning out machines which would do no discredit to Western shops. They have constructed the entire plant needed for the

manufacture of powder for the Government, as well as a large number of lathes for the arsenal, besides other machinery and machine tools, which are said to do the work required of them in a satisfactory manner. In addition to being an excellent and docile mechanic, the Chinaman is about to try his skill as a shipbuilder. The first of ten corvettes, to be built of steel and iron, has been commenced. Each of these vessels will have 1,400 tons displacement, and the whole of the ten will be absolutely built and finished by Chinese workmen. Even the engines and boilers will be made and fitted on the spot, and will be of the most approved types. These facts, selected from a number of the same kind, serve to show that China is not standing still, but is making progress which, if continued, may some day revolutionize the present conditions of trade in the Far East.

New Inventions.

Henry M. Wyeth, of Salt Lake City, Utah, is the inventor of a force-pump in which the cylinder is made of a square block of wood of suitable dimensions, bored longitudinally in the direction of the grain, and then split into two pieces. The ends of the pieces are grooved to receive the heads, the upper head having an opening for the plunger-rod. The two sections of the cylinder are joined, and are connected to a flat block, somewhat longer than the cylinder, and attached to one side of one of the cylinder halves. This block has a longitudinal bore extending entirely through it, one end being the water inlet and other the outlet. The bore communicates by valve chambers with the cylinder above and below the piston. The water enters the block at its inlet, passes into the cylinder, and is thence forced out of the block outlet.

A regenerator for hot-blast stoves has been patented by F. W. Gordon, of Pittsburgh, Pa. Such stoves are ordinarily built to a height of 60 or 80 feet, and with this partition walls between the flues. Any derangement of the brickwork, due to warpage, &c., sometimes results in the tumbling down of part of the walls, and frequently the displacement of a single brick will result in clogging a flue. The flues are inclosed by two series of walls which cross each other at right angles. The inventor claims as an improvement that he uses bricks of a width equal to the thickness of the walls and having a length equal to the width of the flue, plus one-half of the thickness of the walls. Each brick has thus one end abutting against the end of another brick and the other end against the side joint of two abutting bricks. Thus each brick reaches across the flue and half-way into the flue wall, and the brick, even if loose, cannot be so displaced as to fall into the flue.

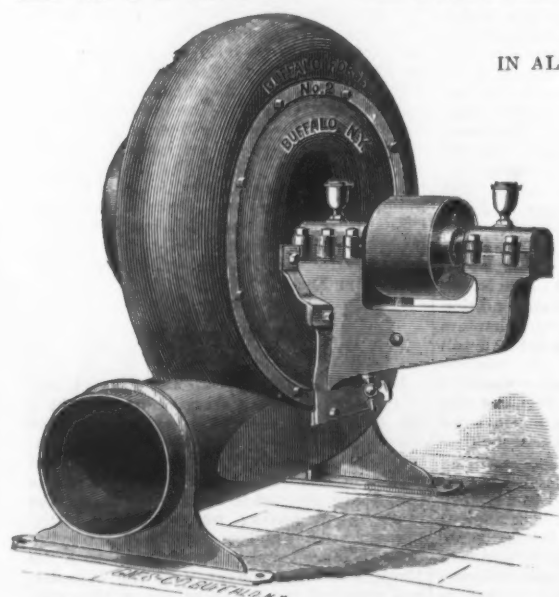
A new coke oven, in which, in case of interruption of the operation, some coke shafts may be thrown out, and each separate coke shaft utilized as a generator, has been patented by H. Stier, of Zwickau, Germany. The coke shafts are surrounded by the heating shafts, so as to isolate the former. The coke shafts have an opening at the top and at the bottom, while the heating shafts are provided with openings in their walls, through which the heating gases may pass. Generators are placed on the outside of the plant, and inclose between them a channel which carries off the products of combustion. The heating gases passing through the generator are mixed with air, enter the heating chambers, and finally escape through proper funnels. The vapors and products of distillation developed in the coke chambers pass into a condenser, while the lighter non-condensable gases pass into a main gas channel, from whence they may again be utilized for heating the coke chamber.

The objects of a patent taken out by A. M. G. Sebillot, of Paris, France, is to provide a means by which metallic zinc may be obtained in blast furnaces from ores containing zinc mixed with iron and other metals. The blast furnace, which is constructed in the usual manner, is provided with two outlet-pipes for the gases, one at both top and bottom. The upper pipe conveys the gases from the furnace into a condensing chamber divided into a series of compartments, and provided with an exhausting fan. The lower pipe, which is subject to the most intense heat, is connected with a chamber filled with charcoal, through which the gases must pass. The charcoal is kept at a red-heat by the gases passing through, and converts the carbonic acid into carbonic oxide, leaving the vapors of zinc free from carbonic acid. These vapors are condensed, and the molten or liquid zinc collects in a chamber, from which it can be drawn by means of a cock. This method has been designed to overcome the difficulty which has heretofore been encountered—that the vapors of zinc are converted into oxide of zinc by the presence of even the smallest quantity of carbonic acid.

A clevis for coupling the forward axle of a farm wagon to the timber tongue of a grain binder truck has been patented by R. Hamilton, of Franklin, Ind. The clevis, in the form of a staple, has the upper horizontal arm longer than the lower arm. The two arms are placed at a distance apart, so as to straddle the axle of the farm wagon. The upright side of the clevis is at its top bent outwardly, and to the offset thus formed is attached the tongue of the truck. By this construction the tongue is held in place above the slide-bar of the wagon.

A spring hinge for doors opening in both directions forms the subject of a patent granted to W. Duncan and the Union Brass Manufacturing Company, of Chicago, Ill. The invention is designed to provide an arrangement whereby the tension of the coiled spring can be changed when applied to doors of different weight. The upper end of the spring is attached to a rod, which is incased in a cylindrical spindle. Both rod and spindle are provided with a series of radial holes in the same horizontal plane. By turning the rod in either direction the ten-

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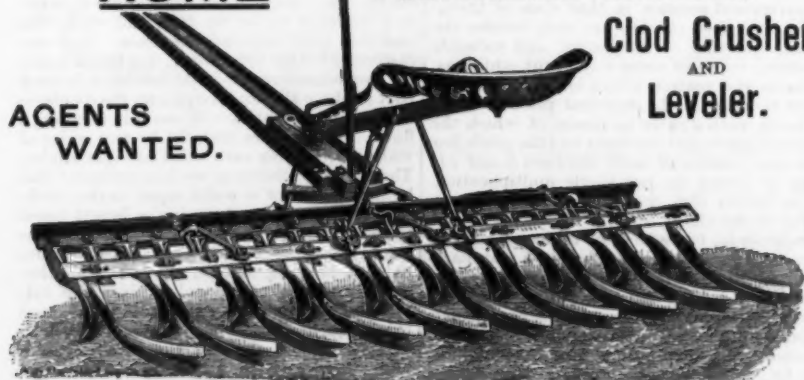
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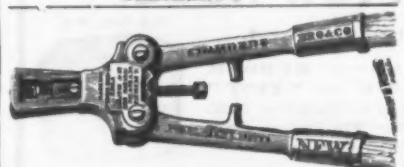
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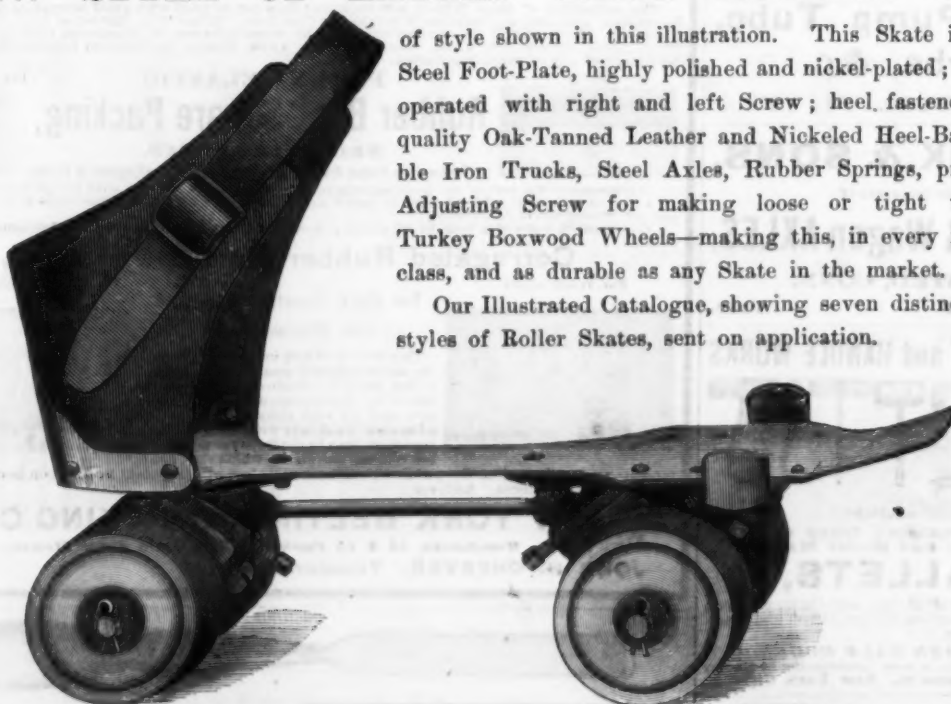
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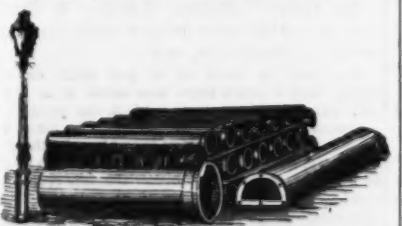
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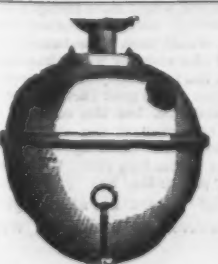


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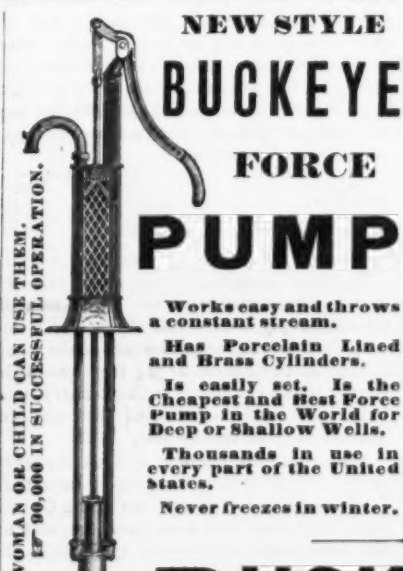
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sion of the spring is increased or diminished. The rod may be locked in any position by a pin passing through one of its holes and entering one of the holes of the spindle.

A socket for barrels or other receptacles from which liquids are drawn through faucets has been patented by F. G. Kincaid, of Somerville, and C. A. Chamber, of East Bridgewater, Mass. The socket is a hollow sleeve screw threaded at its interior of a size to fit into the tap-hole. A valve disk having a screw-threaded hollow shank enters the socket and closes against the inner end of the same. When the faucet is inserted it will, by engaging lips, unscrew the valve shanks and cause the valve disk to recede. Thus liquid is admitted to the faucet. When, however, the latter is to be withdrawn, it will, on being unscrewed, draw the valve disk against the end of the socket, and thereby close it. In this way the escape of liquid is prevented during the insertion and removal of the faucet.

A new device for packing table knives in dozens, or other suitable quantities, so as to present the goods in a neat and attractive style, forms the subject of a patent issued to G. E. Felch, of Ayer, Mass. This knife-holder is composed of two disks of paste-board, leather or any other suitable material, connected by a central rod or bar and provided with radial slots or sockets. The slots in each disk alternate in size, so that six narrow or blade slots and six wide or handle slots are formed. The distance between the disks is such that a knife can rest at one end in a socket of one disk, and at its opposite end in a socket of the other disk. The radial arrangement of the sockets enables the knives to be held in a circular series, occupying comparatively small space, and adapted to be placed in a cylindrical box.

F. S. Hoyt and P. D. Storch, of Chicago, Ill., have constructed a machine for holding broom sockets while being wound, the machine being intended especially for that class of brooms in which the head is secured to the sockets before the handle is applied. The inventors use a hollow mandrel or tube slotted at one end, so as to spring together, within which the follower plays. The workman first draws back the follower, allowing the slotted end of the mandrel to spring together. The broom socket is then placed over this end, and the follower is pushed forward, extending the mandrel and causing it to tightly hold the socket. The broom wire being secured in one of the small notches of the mandrel is made to form the broom head, and is wired upon the socket in the usual manner. When completed, the follower is withdrawn, releasing the socket, which is now ready to receive the handle.

A novelty in scissors and shears has been patented by S. R. Plumb, of Cheshire, Conn. The blades and handles are made in separate pieces, the blades being pivoted together a short distance from one end. The handles are also pivoted together, and are then placed behind the pivot of the blades. The rear extension of each blade is then pivoted to one of the handles. Thus the shears work on two pivots—the handle pivot and the blade pivot. It is claimed that in this way the power of the implement is greatly increased. The blades operate like those of an ordinary pair of shears, but with the additional leverage.

WASHINGTON NEWS.

HOUSE FOREIGN AFFAIRS COMMITTEE.
January 23.—The House Committee on Foreign Affairs informally discussed measures relating to the Inter-oceanic Canal, and determined that formal consideration of that subject would be given at an early day. The incidental expression of opinion indicated that a strong enunciation of the Monroe doctrine will be the ultimate result of the committee's deliberations. It is understood that Representatives Curtin, Belmont and Rice will be made a sub-committee to consider the subject. The Canadian Reciprocity Treaty was referred to Messrs. Belmont and Hitt.

THE HAWAIIAN TREATY.
January 23.—The Senate Committee on Foreign Relations this morning ordered an adverse report upon the resolutions introduced by Senators Jonas and Gibson requesting the President to take the necessary steps to terminate the Hawaiian Reciprocity Treaty. A minority of the committee will report in favor of the resolutions.

COPYRIGHTS FOR FOREIGNERS.
January 23.—Messrs. Dorsheimer, Culbertson and Poland, of the House Committee on the Judiciary, to-day recommended to the full committee the passage of the Dorsheimer bill, with certain amendments, which grants copyrights to citizens of foreign countries. The bill grants the privilege of copyright to citizens of foreign countries for 25 years when like privileges are granted to American citizens. The amendments offered extend the time to 28 years, with a right of renewal of 14 years.

AMERICAN SHIPPING INTERESTS.
January 24.—Representative O'Neill, of Pennsylvania, introduced in the House to-day a bill "To Encourage the American Merchant Marine," and it was referred to the special Shipping Committee. This is the bill recommended by the Philadelphia Maritime Exchange, and provides that all American built and registered vessels sailing to foreign ports, by giving ten days' notice to the Postmaster-General, shall take whatever mail matter there may be for that port and be paid 25 cents for each registered ton for every 1000 miles run by steamers and 15 cents for sailing vessels, the act to go into force January 1, 1885.

The Senate Committee on Commerce continued the consideration of the shipping bill this morning. The proposition to allow ships to purchase stores from bonded warehouses without payment of duty, and to give a drawback upon materials entering into the construction of vessels built in the United States on foreign account, were approved.

TARIFF SPECULATIONS.
January 27.—According to the Republican members of the Ways and Means Committee,

the subject of tariff legislation has not been broached in any meeting of the committee since it was organized, nor have they received any intimation from Chairman Morrison or other Democratic members of the committee as to what are the purposes of the majority. They have heard several rumors, but nothing definite. One rumor is that Colonel Morrison has concluded to present a bill providing for a "horizontal" reduction of duties on articles included in a number of schedules of the tariff law, and for the transfer to the free list of several important articles upon which duties are now imposed. The Republicans understand that the chairman will aim at an average reduction of about 20 per cent., taking the entire dutiable list into consideration. As they do not expect he will propose a reduction on wines and liquors, tobacco, silk and silk goods and some other schedules, they believe that on some of them—say, cotton goods, metals and woolen goods—the reduction proposed will exceed 20 per cent. Among the articles which they believe he will ask to have placed on the free list are salt, lumber and iron ore.

MEASURES BEFORE THE HOUSE.

January 27.—The two or three appropriation bills which were promised three weeks ago have not made their appearance in the House, and, in fact, are not yet out of the hands of the sub-committee on Appropriations. The shipping bill recently reported from the Select Committee on Shipping is perhaps the most important measure before the House, and it is expected that a motion will shortly be made by General Slocum to proceed to its consideration in committee of the whole.

CUSTOMS DECISIONS BY THE TREASURY DEPARTMENT.

January 29.—The following is a synopsis of the decisions rendered by the Treasury Department in customs cases during the past week, so far as they relate to metals: Metal puff boxes, light in weight, the bodies of which were composed principally of pewter and lead, and forming a substance analogous to Britannia ware, and the bottoms composed of zinc—held to be dutiable under Paragraph 210 for Britannia ware. (Letter to Collector of Customs at Baltimore.) On the trial of the suit of Scott against McClung, in the United States Circuit Court at Cincinnati, involving duties on corrugated sheet iron, the article was held to be dutiable at 35 per cent. ad valorem, as a manufacture of iron not otherwise provided for under the tariff act of June 22, 1874. The department has acquiesced in the decision. (Letter to the Surveyor of Customs at Cincinnati.) Iron show cards, intended for distribution and claimed to be dutiable under Paragraph 384, for all printed matter—held to be dutiable as a manufacture of iron at 45 per cent. ad valorem, the provision for printed matter in Paragraph 384, which is in the paper schedule, including only printed articles of paper. (Letter to the Collector of Customs at Boston.) Drawn steel wire, larger than No. 5 wire gauge—held to be dutiable at 45 per cent. ad valorem, under Paragraph 210, for manufactures composed of steel, and not at 3 1/2 cents per pound, under Paragraph 177, as steel in billets or bars. (Letter to the Collector of Customs at Chicago.)

SUNDRIES.

January 29, 1884.—The Senate to-day passed the House bill making an appropriation of \$3,750,000, or so much thereof as may be necessary, to supply deficiencies on account of appropriations for the fiscal year ending June 30, 1884, in regard to the rebate of tax on tobacco, and to provide for the meeting of the Legislature of New Mexico, for which last-named purpose \$21,965 is appropriated.

Representative Morrison, chairman of the Ways and Means Committee, has completed a tariff bill, but will not introduce it in the House until other members of the committee have had an opportunity to consider it and offer suggestions. As prepared, the bill provides for a general horizontal reduction of 20 per cent., but in no event is the reduction to be lower than the tariff rates in the Morrill bill of 1861.

Mr. Harris, president, and Mr. Gray, general solicitor, of the Northern Pacific Railroad Company, made arguments before the House Committee on Public Lands, to-day, against the forfeiture of the land grant of that road. Members of the committee say that a bill will be reported declaring forfeited all the land along the portion of the line which was not completed within the time specified in the granting act.

At a meeting of the House Committee on Banking and Currency, to-day, the resolution of Representative Hunt, of Louisiana, was adopted by a vote of 8 to 4. Those opposing were Messrs. Buckner, Miller, of Texas, Yaple and Brumm. The resolution declares it to be the sense of the committee "that the public welfare demands that the benefits of the national banking system be substantially preserved and continued for the time being, provided that this resolution shall not be construed to be a declaration in favor of the perpetuation of the public debt."

SOME NEW HOUSE BILLS.

January 29.—Among new bills introduced in the House to-day were the following: To prevent the employment of operatives on railway trains more than 12 hours out of 24; providing for inspection and certification of meat products for exportation; to reduce the tariff rates on different grades of sugar; to reduce the duty on woolen goods, flannels, blankets, women's and children's dress goods and ready-made clothing; to prevent the adulteration of sugar and molasses; to refund duties on goods on shipboard when the tariff act of 1883 went into effect; granting permission to dig for treasure and minerals on the Government lands at West Point; to alter the mode of collecting internal revenue tax.

The repeated failures of Colonel Paine's grip on the Brooklyn Bridge cars have already materially affected the Patent-Office records, and applications for patents on grips are now coming in regularly from week to week. It would seem, in fact, as though the near future would usher in an array of patent grips that will leave car couplers, low-water alarms, electric appliances, and other devices now popular with inventors, entirely in the background.

The Iron Age

AND
Metallurgical Review.

New York, Thursday, January 31, 1884.

DAVID WILLIAMS, Publisher and Proprietor.
JAMES C. BAYLES, Editor.
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The Condition of Business.

Considering the season and the severity of the weather, the volume of business in iron and steel reported to us for this vicinity has been quite fair during the past week. Some houses, it must be stated, are doing less than usual, and are disposed to complain of the situation; but others are doing more, so that, though activity is by no means universal, neither is dullness prevalent. In steel rails one company reports transactions aggregating 30,000 tons, while the other companies, almost without exception, have found matters quiet and inquiries few. The situation of pig iron is about as it has been; in some quarters business is very satisfactory, and orders are daily received for large lots, while in other directions the sales made are only of an ordinary character. In manufactured iron there is a little more activity, but it is not general. The merchant-steel trade is looking up a little in volume, but in other respects it is not satisfactory, as competition is growing more keen in special lines.

Prices generally are about as they have been for some time past. Steel rails are held at \$34 at mill in Eastern Pennsylvania, but it would be difficult to place an order for spring delivery with the companies which quote this price, as they are understood to have all the work they can possibly turn out in the spring and early summer months. Pig iron shows no change in price, but the companies which have been selling at the lowest rates will, it is intimated, shortly advance their prices slightly. Bar iron is held more firmly, and concessions are rare on first-class grades of best refined. Other kinds of manufactured iron command the prices which have been ruling for some time, though occasionally we hear of offers of sheet iron by Western mills at rates slightly under the local figures. Steel plates are the subject of active competition, and some makers are offering lower prices than any which have heretofore been quoted. Small lots of steel rails and planished sheet iron have been sold for export, the former to go to Cuba and the latter to England.

In order to keep up with the progress of the times, and to be thoroughly informed as to the state of an art in any department of manufactures, it is necessary to give attention to the numerous patents which are being issued from week to week. It is proverbial that only one in a very large number of the patents which are taken out ever becomes remunerative; but it still re-

mains that a careful study of the Patent Office records will furnish a fund of information that is hardly to be obtained in any other direction. Some insignificant and almost worthless idea which may be patented by an obscure inventor frequently suggests something of real merit in the mind of one who is more closely connected with the active work of the age in the particular direction indicated. Hence the importance of a regular and systematic inspection of Patent Office records upon the part of those in any division of the mechanical trades who desire to keep abreast of the progress of the times. Our readers will find in our columns from week to week some of the more important current inventions in the line of mechanics, and also notices of miscellaneous inventions of general interest. These short paragraphs are not among the least interesting and valuable portions of our weekly issues.

Stocks of Domestic Pig Iron on January 1.

Makers' stocks of unsold pig iron have fluctuated during the past twelve months very considerably, according to the several statements issued by the American Iron and Steel Association. On the 1st of January, 1883, the stocks aggregated 383,655 gross tons of all kinds of pig iron, scattered all over the United States. In the next six months there was an increase in stocks of 144,935 gross tons, the statement for the 1st of July showing 528,590 tons. In the following four months the production of pig iron was sufficiently restricted to cause a decrease in stocks of 96,237 tons, the statement for the 1st of November showing 432,353 tons. In the last two months of the year the consumption of pig iron fell off faster than the decrease in production, and stocks increased 44,254 tons, the statement for the 1st of January of this year showing 476,607 tons. Taking the range of the whole twelve months, there was a net increase in stocks of 92,952 tons of all kinds of pig iron. This increase in stocks would be rather discouraging if the details did not show some results of a much more cheerful character.

It is well known that in the past four years the production of charcoal pig iron has been exceptionally large in the United States, and the stocks of charcoal pig iron held by the makers have also been excessive. The large stocks of charcoal pig iron swell the total stocks to their present undesirable proportions. Out of a total stock of 383,655 tons on the first of last January, 147,535 tons were charcoal; of 528,590 tons on July 1, 145,756 tons were charcoal; of 432,353 tons on November 1, 145,003 tons were charcoal; and of 476,607 tons on the 1st of the present month, 164,266 tons were charcoal. As charcoal pig iron commands a special field, and there are only certain well-defined localities in the country in which it is used for all purposes, we will separate it from the stocks of other kinds of pig iron, and show how very meagerly the country is at present supplied with the pig iron which it uses the most widely. The following table will exhibit the stocks of anthracite and bituminous pig iron on the four dates we have been comparing:

	Jan. 1, 1883.	July 1, 1883.	Nov. 1, 1883.	Jan. 1, 1884.
Pig iron.	189,707	186,735	128,380	128,948
Anthracite.....	95,707	100,735	128,380	128,948
Bituminous.....	94,000	86,000	0	0
Total.....	189,707	186,735	128,380	128,948

From this table it will be seen that the stocks of anthracite pig iron are now about the same as they were on the 1st of November, while the stocks of bituminous pig iron have increased, but only about 25,000 tons. There would seem from these figures to have been no increase in stocks in this locality during the latter part of the past year, as no bituminous pig iron is produced very near here. As compared with the 1st of July, there was a decrease of over 70,000 tons in the stocks of anthracite and bituminous pig iron. The manufacturers of pig iron certainly have in the facts here presented good reasons for considering their branch of the iron trade in condition to respond quickly to any symptom of improving business. These stocks comprise all grades, from Bessemer to forge, and, when the vast requirements of the country are considered, it must be admitted that a very slight increase in the demand would cause an apparent scarcity of pig iron. The situation is very different from that of 1873 or 1874. At that time, when consumption was much lighter, stocks were a great deal heavier, and years were required to work off the surplus.

Iron ties will probably have the benefit of another trial on Belgian State railways, a number of Belgian iron manufacturers having petitioned the Minister of Public Works to take favorable action in the matter. The first experiments made with such ties in Belgium were unsatisfactory, but those tests are now claimed as having been inconclusive, the material and arrangement having been such as to preclude the possibility of obtaining favorable results. It is argued in support of such trials that experiments in Germany have proved the value of iron sleepers, and that Government and private contracts for some 20,000 or 30,000 tons are there given out. The facts that Belgium now imports wooden ties, that the adoption of iron ties would in a great measure relieve Belgian iron manufacturers from the difficulty now experienced in finding employment for their men, and that a native industry would thus be greatly benefited, are all cited in behalf

of the movement. Some of the claims are evidently well founded, and the institution of further tests in this direction may consequently be looked forward to with some certainty.

Canadian Reciprocity.

A movement, which promises to be quite strong, has been inaugurated in favor of reciprocity in coal and iron ore between the United States and Canada. Under existing laws, anthracite coal from the United States pays a duty of 50 cents per ton and bituminous coal pays 60 cents per ton to cross the Canadian border, while either coal or iron ore from Canada pays a duty of 75 cents per ton to enter the United States. These duties are regarded with disfavor by those Canadians who desire to purchase coal from the United States, and by those United States coal operators whose coal is or could easily be marketed in Canada, as well as by certain citizens of the United States who have purchased iron-ore lands in Canada and desire to ship the product to be smelted on this side of the line.

On the 27th of December last an organization of United States coal, iron and railway operators was effected in this city for the purpose of advocating the removal of these trade restrictions, under the name of the "Association for Reciprocity in Coal and Iron Ore." The officers elected were E. N. Frisbie, president; W. C. Andrews, treasurer; Charles J. Pusey, secretary. A committee consisting of E. N. Frisbie, James Tillinghast, John Moulton, H. C. Roberts, Samuel Thomas, W. C. Andrews and Charles J. Pusey was appointed to visit Ottawa and ascertain the disposition of the Canadian Government toward such a movement. This committee was at Ottawa recently in consultation with the Ministers of Finance and Customs, and was assured by them of the favorable action of the Canadian Cabinet. On the 24th of the present month a meeting of the producers of bituminous coal in North-western Pennsylvania was held in this city. The market of these operators is mainly at such points as Rochester, Buffalo and Erie. Hon. Galusha A. Grow, of Pennsylvania, presided. As their mines are now producing more coal than can be absorbed in the ordinary course of trade, the meeting, which was very largely attended, considered several plans of relief. They not only agreed upon a restriction of production, but also unanimously adopted the following resolution:

Resolved, That we are in favor of reciprocity with Canada on coal and iron ore, and we heartily approve the efforts making by the "Association for Reciprocity in Coal and Iron Ore" to secure the necessary action by the Governments of the United States and Canada to obtain such a result.

There is said to be a strong organization of capitalists at Cleveland who are interested in Canadian ore deposits, and who were reported some time ago as in favor of having the duty on ore reduced, notwithstanding the fact that they also control mines in the Lake Superior region. The present movement in favor of Canadian reciprocity is said to have originated on this side of the border among some of the interests above referred to. Being assured of the favorable attitude of the Canadian Government, they are now doing all they can to secure the proper action by Congress. A bill is to be drafted covering the enactment desired, and a committee will visit Washington to endeavor to pass it through both Houses. Such a measure will naturally incur the hostility of the coal operators of Central Pennsylvania, Maryland, Virginia and West Virginia. The fight over the bituminous-coal duty last winter showed that the coal trade had the power to retain the old duty on bituminous coal, in spite of the general reductions then made in the tariff. Nova Scotia coal was the competitor which it was desired to handicap, and it seems doubtful if special legislation will be permitted to accomplish that which the general tariff was directly intended to oppose. But it may be possible to pass a bill through the present Congress, which radically differs in sentiment, politics and sympathies from the last Congress, notwithstanding the opposition of the coal trade.

While the abolition of the duty on Canadian iron ore will hardly be acceptable to Lake Superior iron-ore producers generally, it would strongly displease Eastern manufacturing interests, which have for years been importing Spanish and other Transatlantic ores, and will shortly be importing Cuban ores. They would hardly feel like consenting to the endowment of the West with still greater advantages over them. Cheaper Western ores would undoubtedly mean fiercer competition for domestic trade. In that event, we take it, the Eastern manufacturers would favor the entire abolition of the iron-ore duty. It really appears to us that an appeal to Congress, as it is now constituted, for greater freedom of international trade, will receive more ample consideration and larger appreciation than petitions for legislative favors are apt to have granted them.

One of the most important additions to the literature of sheet metals which has appeared in our columns in a long time is the classification of tin plates which we present in another portion of this issue. Numerous lists of brands have been published from time to time, and great stress has been laid by importers and dealers upon the importance of buying plates by brand, and thus getting exactly what is ordered. The consumer, appreciating the value of this advice, has

often attempted to act upon it, but has invariably been met with a difficulty at the outset which has been well-nigh insuperable. He has found, on investigating the subject, that no authoritative list of brands, with an indication of grade and quality, was to be found. Hence, in ordering by brand, although he might receive what he ordered, he still might fail to get what he wanted. Even those houses which have been most conspicuous in trading upon makers' brands have apparently been reluctant to make public a schedule of grades. The difficulties of correct classification of tin-plate brands are very great, and it is not at all strange that importing houses should hesitate before venturing upon such an undertaking. The unreliability of many manufacturers of tin plate, particularly some of the Welsh firms, is generally recognized. We mean unreliability in the sense of frequent deviations from standard in point of quality of goods produced. Great as these difficulties are, however, they have not deterred a firm of enterprising metal brokers in this city from issuing a classification such as the trade has long wished to possess. As we have explained elsewhere, this list is not official in the sense of being guaranteed by the makers of the plates named or by any importing house. It simply represents the judgment of the firm which publishes it. In it they have given to the trade their ideas of the relative grade of the various brands of plates named, which, considering the circumstances of their position, is likely to be very correct. We suggest to our readers that it is worthy of more than ordinary attention.

Production of Pig Iron and Bessemer Steel in the United States.

The Secretary of the American Iron and Steel Association has succeeded thus early in collecting the statistics of the production of pig iron and Bessemer steel for 1883. The total quantity of all kinds of pig iron manufactured in the United States last year was 4,595,510 gross tons. This was very slightly below the production of 1882, which was 4,623,323 gross tons. The production of 1881 was 4,144,254 gross tons. The year 1883 was therefore a long distance ahead of 1881, and but very little below 1882. The following table shows the quantity of pig iron made, according to the fuel used, in 1883, as compared with 1882:

	1882.	1883.
Pig iron.....	2,174,855	2,401,473
Anthracite.....	1,823,338	1,683,568
Charcoal.....	625,130	510,469
Total.....	4,623,323	4,595,510

The most remarkable fact about this exhibit is the increase in the production of bituminous pig iron, while there was a decided decrease in the production of the other kinds. More bituminous pig iron was made in 1883 than ever before in this country, and for the first time it exceeded the combined production of all other kinds.

Concerning the number of blast furnaces in the United States, Mr. Swank says that at the close of 1882 there were in the United States 687 completed blast furnaces, and at the same time there were 27 furnaces in course of erection. During 1883 there were 13 new furnaces completed—10 coke, 2 charcoal and 1 anthracite; and 17 furnaces were either burned or abandoned—12 charcoal, 4 anthracite and 1 bituminous. At the close of 1883 we had 683 completed furnaces in the country, and the information received shows that at that time there were in course of erection 19 furnaces—12 coke, 3 charcoal and 4 anthracite—some of which are included above in the furnaces under construction at the close of 1882.

The 15 Bessemer steel works in the United States produced 1,477,346 gross tons of ingots in 1883, which was a decrease of 37,342 tons on the production of 1882. Mr. Swank says: "This is a much smaller decrease than has been generally supposed. It was, however, the first decrease that has occurred in the history of the Bessemer steel industry of this country." The quantity of Bessemer steel rails produced in 1883 was 1,119,576 gross tons, against 1,191,383 tons in 1882. In reference to the total production of all kinds of steel rails, Mr. Swank says:

The figures given for 1882 do not cover the total production of steel rails in the United States in that year, as there were 108,806 net tons of Bessemer rails rolled in iron rolling mills, chiefly from imported steel blooms, and there were also 28,766 net tons of open-hearth steel rails rolled, making a total production in 1882 of 1,400,930 net tons of steel rails. In 1883 we rolled very few tons of Bessemer steel rails in iron rolling mills, either from imported or domestic blooms, and we probably made fewer open-hearth steel rails in 1883 than in 1882. In the absence as yet of complete statistical returns, we estimate the total production from these two sources at considerably less than 50,000 net tons. Adding, say, 48,075 tons from these sources to the 1,352,855 net tons of Bessemer steel rails ascertained to have been rolled in 1883 by our Bessemer steel works, we have a probable total of 1,800,930 net tons of steel rails rolled in the United States in 1883, or 100,990 tons less than in 1882.

On the whole, Mr. Swank's statistics show steady progress in the production of iron and steel in the United States.

Last week we published the statistics of the anthracite-coal production of Pennsylvania, which showed a large increase in 1883 as compared with 1882. Since then we have received the report of the coal production of the Cumberland district, which likewise shows a heavy increase in 1883 over 1882. The report is compiled from official sources in the office of the Cumberland and Pennsylvania Railroad Company, Mount Savage, Md. It shows that in 1883 there

were mined and shipped 2,544,173 tons of coal, against 1,540,466 tons in 1882, being a gain of 1,003,707 tons. This gain was largely due to a strike of the miners in 1882, which greatly curtailed the production of that year, but it does not account for the whole of the gain, as 1883 shows a heavier production than any year since 1873, when the maximum production of the region was reached. The following table shows the annual production for the last 11 years:

	Tons.	Tons.	Tons.
1873.....	2,674,101	1877.....	1,574,339
1874.....	2,410,896	1878.....	1,679,322
1875.....	2,345,773	1879.....	1,780,709
1876.....	1,835,081	1880.....	2,136,160
		1881.....	2,361,918
		1882.....	1,540,466
		1883.....	2,544,173

The Tariff Question in New York and Pittsburgh.

Though New York is considered the headquarters of the free-trade sentiment of the United States, it is remarkable that the local Board of Trade should decide by a very heavy majority against free ships. And, on the other hand, as Pittsburgh is considered indissolubly wedded to the doctrine of protection, it is singular that some of its leading manufacturers should now openly advocate free trade. The meeting of the New York Board of Trade at which the action above referred to was taken was held on the 21st instant. A special committee had reported in favor of admitting foreign-built ships to American registry, and the free admission of ship materials and supplies. Mr. John Roach opposed the report of the committee, and offered a substitute favoring the passing of laws encouraging the building of American ships for the foreign trade by exempting them from all taxes, by dividing the receipts from tonnage dues among them *pro rata*, per mile annually, and by the proper distribution of mail contracts. The resolutions were discussed at three meetings. So much interest was taken in the matter that Mr. Simon Sterne, an attorney, appeared in behalf of free ships. His clients, however, were overwhelmingly defeated when the votes were counted, which stood 24 for the Roach resolutions to 7 for the committee's report. To make the decision more emphatic against free ships the following resolution was also adopted:

Resolved, That it would be wiser to adopt the policy that has been so successfully followed by foreign Governments, and which has resulted in taking from us nearly all of our ocean carrying trade.

Some Pittsburgh manufacturers have expressed their views to a New York *Herald* reporter, and they are printed in the issue for January 21. Mr. Thomas B. Atterbury, the president of the Pittsburgh Iron and Glass Savings Bank, as well as the head of the prominent glass manufacturing establishment that bears his name, is reported to have expressed opinions of which the following is an abstract.

The sooner they get the tariff off iron and glass the better for all concerned. If the manufacturers about here would look at this question practically they would generally change their opinions. Today the wages in all grades of skilled labor are at least 30 per cent. higher than the market warrants. The result is that mills on all sides are closing down until there is a greater demand for their products. If skilled labor could be reduced 30 per cent. we would not only have nothing to fear from competition, but would get a foreign market for the manufactured material. In the matter of table-ware and pressed glass I should like to see free trade right away. To-day we are shipping to Germany and the rest of the world in spite of all tariff restrictions. We are actually putting beer glasses down in Germany cheaper than they can do it themselves.

Mr. Henry S. McKee, of McKee & Brothers, one of the three largest glass manufacturers of Pittsburgh, said:

We have a tariff of 40 per cent. on our goods, and I don't care how soon it is taken off. Our machinery is so perfect, our product is so great and our men are so quick to make improvements in our methods that I have nothing to fear from the competition of the rest of the world. If we had free trade to-morrow the laborer would get low wages, but the cost of his living would go down, too. His advantage would, however, spring mainly from the fact that his work would be more steady. The best evidence that we do not want protection is that my firm is to-day shipping to all corners of the world, from Australia to Germany.

Another interview on the tariff was held by the *Herald* reporter with a member of one of "the largest steel-manufacturing concerns in the country," who, however, did not care to have his name published. He said:

"We have got to a point in our industrial history when we must find an outlet for our surplus manufactures. Our physical resources are the finest in the world. England cannot approach us in the wealth which nature has given us. We have here altogether the most perfect machinery known to manufacture. In the steel industry we are far ahead of England in our capacity to produce the finished article with the minimum manual labor. No workmen in the world are so expert in handling labor-saving implements as the Americans. We are to-day introducing into Pittsburgh a fuel that will displace coal entirely, if I am not much mistaken. I refer to the natural gas that is led from artesian wells to the furnaces in tubes, sometimes 30 miles long. This gas is not only cheaper than coal, but saves on our works alone the wages of nearly 100 men. But where we stumble is on the question of labor. Our tariff taxes all household utensils, clothing and other necessities so heavily that the American laborer must get very high wages in order to exist. There is no question in my mind but that if the tariff were taken off the laborer would be as well off as to-day under 'protection.' We might stop work for some time until things generally came down to a solid level, but, when they did come down, we would have cheaper ores, cheaper coal of living, and, in consequence, cheaper labor. We would then manufacture successfully again, and give steadier work than under a tariff that makes the trade subject to enormous ups and downs. Some of the poor factories would be wiped out of existence, but the country can spare them. However, even if the Government bought them out and shut them up, the people would be the gainers in the long run. We want a little time, but this 'protection' has 'got to go.'"

The situation of affairs as above given seems to be the reverse of what one would

expect. A protectionist victory in New York and a free trade sentiment springing up in Pittsburgh are somewhat surprising. Taken altogether, however, these facts illustrate the feeling throughout the country to which the National Board of Trade alluded on the opening of their sessions in Washington on the 23d inst., when they reported, through their Executive Committee, that "with regard to the tariff the same difference of opinion has shown itself within the membership of the National Board of Trade which is to be found in the community at large."

Position of Scotch Pig Iron.

After a long period of depression and progressive shrinkage in prices, the New York market for Scotch pig iron has experienced a marked change. Prices are not only firm, but for some brands a decided advance has been established. The change was a sudden one, and was not generally anticipated, though for several weeks importers have been assuring their customers that prices were so low that a reaction might be expected at almost any time, and they advised them to buy then in the belief that prices could certainly go no lower. But the market had been dragging along in a weak condition for so many months, and sellers appeared so anxious to book orders, that buyers generally held off, thinking they could do better in the future, or at least could get their supply of iron at the same price whenever it was actually needed. The market was also being demoralized from time to time by the arrival of iron which had to be sold for various reasons, and could sometimes be bought from ship or dock very much below regular quotations. But some customers were found who were willing to be persuaded to give their orders, and they have certainly benefited by their action, especially when they have bought such irons as have advanced most in price.

The outlook at the beginning of the year was undoubtedly gloomy to the general observer, and the tone of the Scotch home market reports was very discouraging. The average price of warrants in Glasgow, in 1883, had been the lowest of which we have any record—our statistics going back to 1863. The average was 46/9, which was 3d. under the average of 1879. The lowest price reached in the year was 42/10, which, however, was not so low as the lowest price recorded in 1878 and 1879, when warrants touched 42/3 and 40/ respectively. The depression continued for some time after 1884 opened, and warrants receded until, on January 8, 42/6½ was touched. On the 9th and 10th an advance was established, which continued until, on the 18th and 19th, 44/6 was reached. Since then the warrant market has reacted, but the rate is still above 43/. Makers' prices have not advanced uniformly. Some have been marked up 4/, while in others there has been no change. The following table will show the prices of makers' brands on the 23d inst., as compared with the 2d inst., using for this purpose the quotations which are cable to us directly from the other side:

	Jan. 2.	Jan. 23.
Coltness, alongside, Glasgow	45/	58/
Langloan, " "	44/	55/
Gartsherrie, " "	50/6	54/6
Carnbroe, " "	52/6	52/
Glenarnock, " "	51/6	52/6
Eglinton, " "	45/6	47/
Dalmellington, " "	48/	49/6
Shotts, " at Leith	54/	51/

The improvement in prices is ascribed to various causes. One is the restriction of pig-iron production which has been adopted in the North of England. This will remove some of the pressure which is bearing severely on Scotch pig-iron makers, and has compelled them to reduce their prices to an unprofitable point. Another cause is the increased demand from several quarters, which the manufacturers hope will continue. The rise in price on this side of the Atlantic is not only caused by the advance in makers' quotations, but also by the stiffness in freights. Our freight quotations last week, as cable from abroad, showed 4/6 to 5/ from Glasgow to New York, as against 4/ two weeks before. Private advices to importers here name even higher freight rates. The following table shows the changes made in New York quotations of Scotch pig iron from the 10th to the 24th inst.:

	Jan. 10.	Jan. 24.
Carnbroe	\$21.00 @ \$22.00	\$22.00 @ \$22.50
Coltness	22.25	22.50
Shotts	22.25	22.50
Glenarnock	21.00 @ 22.00	22.00 @ 22.50
Gartsherrie	22.50	23.00
Langloan	22.50	22.50
Summerlee	21.00	21.50
Dalmellington	20.00	20.50
Eglinton	20.00	20.25

For deliveries at certain times higher rates are quoted in the case of several brands. We are cognizant of one transaction in which 9/ more was asked for a particular delivery than had been asked on the 8th inst.

The firmness in the price of Scotch pig iron has brought out many inquiries, and those who habitually use it for a mixture are a little uneasy about the future. Moderate sales have been made, but buyers hesitate to pay the enhanced prices. At the proffered rates of a few weeks ago they would now willingly lay in good stocks. There is much uncertainty about the strength of the rise, and, consequently, many buyers are taking their chances of a reaction. The price, however, may not react, but may go still higher. But in that case less Scotch pig iron will be used, unless in the meantime the price of American pig iron advances.

The Make of Pig Iron, and Our Quarterly Reports.

We have already called attention to the remarkably correct indication of the make of pig iron furnished by the returns of furnaces in and out of blast which we compile each quarter. These have been published continuously since 1876 and for part of that year. From these tables it has been possible to estimate the actual make of pig iron with an approach to exactness that is really marvelous. The approximations of each grade are not so exact as those of the total, but even these are not far wrong, on the whole.

To show how close to the real make our estimates are, we append two tables. The first one shows the capacity of the furnaces, as given in our quarterly report for each quarter of each year from 1877 to 1882, and an average per week ascertained by dividing the sum of the capacities reported for each quarter by four. In the second table the average capacity per week, as found in the first table, is multiplied by 52, and this taken as the estimated production, and in a parallel column is placed the actual production as given by Mr. Swank:

TABLE OF BLAST FURNACE CAPACITIES, FROM "IRON AGE" QUARTERLY REPORTS.

Date.	Capacity of charcoal blast.	Capacity of anthracite blast.	Capacity of bituminous blast.
1877.			
January	6,330	16,460	21,660
April	6,025	15,340	19,875
July	7,730	17,440	20,560
October	7,887	17,067	19,970
Average per week	6,743	17,302½	20,466¼
1878.			
January	6,634	21,040	22,923
April	5,001	19,410	23,644
July	8,420	19,315	21,735
October	7,079	17,650	19,360
Average per week	6,081	19,350¼	21,913¼
1879.			
January	6,628	20,650	23,336
April	6,256	19,964	23,263
July	7,430	21,082	25,438
October	6,119	19,330	22,573
Average per week	6,358¼	20,731½	23,427
1880.			
January	9,013	35,267	37,342
April	8,842	40,006	39,474
July	11,875	36,189	38,156
October	13,928	29,351	35,700
Average per week	10,929¼	35,350¾	36,440
1881.			
January	14,708	34,845	45,438
April	13,505	35,059	48,410
July	14,590	35,815	45,730
October	15,009	39,324	45,515
Average per week	14,454½	34,117¼	47,039¼
1882.			
January	15,126	33,108	48,658
April	13,596	36,568	52,027
July	15,275	36,715	50,481
October	16,455	36,873	47,723
Average per week	15,274¼	37,563¼	49,300¼

TABLE OF ESTIMATED AND ACTUAL PRODUCTION OF PIG IRON.

Kind of Iron.	Estimated production. Net tons.	Actual production. Net tons.
1877.		
Charcoal	350,038	317,843
Anthracite	806,730	804,797
Bituminous	1,064,935	1,061,945
Total	2,211,611	2,184,585
1878.		
Charcoal	313,612	293,369
Anthracite	1,006,525	1,062,870
Bituminous	1,139,096	1,191,082
Total	2,459,233	2,547,321
1879.		
Charcoal	362,434	358,873
Anthracite	1,124,702	1,173,094
Bituminous	1,438,903	1,438,973
Total	2,926,039	2,970,940
1880.		
Charcoal	568,334	537,558
Anthracite	1,638,289	1,807,651
Bituminous	1,564,880	1,550,305
Total	4,301,453	4,266,414
1881.		
Charcoal	751,534	638,238
Anthracite	1,774,123	1,734,462
Bituminous	2,446,007	2,308,254
Total	4,971,664	4,680,954
1882.		
Charcoal	794,413	607,906
Anthracite	1,663,471	2,042,138
Bituminous	2,402,907	2,434,078
Total	5,150,821	5,178,122

It would be well-nigh impossible to arrive at a closer approximation. The result is all the more remarkable in view of the uncertain meaning of the word "capacity," and the fact that these returns are made up from the separate returns of 150 correspondents. Adopting the same method with the returns for 1883, we have the following results:

Date.	Capacity of charcoal blast.	Capacity of anthracite blast.	Capacity of bituminous blast.
1883.			
January	18,700	82,340	58,144
April	11,092	37,316	48,301
July	18,413	30,100	49,966
October	10,686	29,969	50,452
Av'g per week	11,957¼	34,159¼	50,440¼

From this table we deduce an estimate of the production of pig iron in 1883, which we present in the following table, in connection with the figures of actual production furnished by Mr. Swank:

Kind of iron.	Estimated product. Net tons.	Actual product. Net tons.
Charcoal	621,040	571,723
Anthracite	1,775,315	1,865,516
Bituminous	2,022,915	2,069,650
Total	5,029,254	5,146,971

The general impression among furnace-men has been that the make in 1883 was considerably less than in 1882. The returns do not show this except in charcoal and anthracite irons. Bituminous irons have more than held their own.

British Iron and Steel Exports in 1883.

Advices from Great Britain place the total exports of iron and steel from that country in 1883 at 4,041,273 gross tons, against 4,353,552 tons in 1882, which is a decrease of 309,279 tons. Her exports to the United States in 1883 were 688,137 tons, against 1,195,116 tons in 1882, which is a decrease of 506,979 tons. British exports to other countries than the United States, therefore, increased to the extent of the difference between 506,929 tons and 309,279 tons, or 197,650 tons. The total British exports for December showed a large decrease as compared with November, the figures for December being but 279,081 tons, while those for November were 342,051 tons. In December Great Britain sent to the United States only 37,237 tons of iron and steel, which was 12,908 tons less than the quantity shipped in November. The following table shows the exports to this country from Great Britain in the months of November and December, as well as in the years 1882 and 1883:

Articles.	Nov. 1883.	Dec. 1883.	1882.	1883.
Pig iron	23,659	13,539	428,970	282,924
Old iron	429	4,017	95,583	46,023
Steel, unwrought	865	1,084	131,261	25,430
Cast and wrought, &c.	196	311	6,774	5,008
Tin plates	17,509	10,964	214,502	212,734
Hoops and sheets, &c.	577	730	37,220	32,835
Bar, angle, &c.	364	410	22,445	8,738
Iron and steel rails	6,702	6,192	128,275	75,461
Total	50,195	37,367	1,195,116	688,137

"Improving" the machinery of United States war vessels so as to make it as cumbersome and inefficient as possible seems to be, and always to have been, the hobby of the Navy Department. The engines designed for the new cruiser Chicago have already been taken in hand and reconstructed on paper to such an extent as to cause the designer's resignation as a member of the Naval Advisory Board, and at present it would seem as though some difficulty would be experienced in finding any one to fill the vacancy. American men-of-war have long enjoyed the reputation of being among the slowest and most poorly-equipped specimens of marine architecture, and why such strenuous efforts should be made to further improve upon them in this direction is an interesting question.

The iron-ore miners of Port Henry, N. Y., evidently believe in reciprocity. It is stated that, after the ore companies had announced a reduction of from 10 to 15 cents a day in the wages of their employees, the latter held a meeting and determined to ask for a 10 per cent. reduction in the price of wood furnished them by the companies, and in their house rent.

The reductions in ironworkers' wages penetrate to the most distant localities of the United States. Even the workmen of Oregon do not escape. A telegram from Portland, dated January 23, says that the iron manufacturers there have given notice to their employees of a reduction of 12½ per cent. in their wages. The reduction affects 420 men.

Remarkable Work at Isabella Furnace No. 1.

To the Editor of The Iron Age: Through the courtesy of Mr. Hugh Kennedy, general superintendent and founder of Isabella Furnaces, near Pittsburgh, Pa., we examined the records of the three years' blast of No. 1 furnace, now out of blast for repairs. The product has been as follows, 2265 pounds to the ton:

	Tons.
Iron made in 1881, 334 days	37,457½
" " 1882, 365 "	39,322
" " 1883, 305 "	36,405¼
" " 1884, 19 "	3,927
Total	166,805

Average per week, 1062 tons.

Blast put on, February 10, 1881.

Blast taken off, January 30, 1884.

Duration of blast, 2 years 11 months 10 days.

Total stock used, 667,230 tons (gross).

Shortly after starting, a heavy freshet in the Allegheny River flooded the works and stopped the furnace with a full burden on for 10 days. On starting again the furnace was found badly scaffolded, which required 14 days' fighting before the furnace began to operate fairly. The first year's product was also lessened by not having sufficient capacity in the hoist to elevate the stock rapidly enough. An additional hoist has since been erected. The ore mixture ran practically the same the whole blast; 4 tons stock made 1 ton of iron. The iron averaged Nos. 2 and 3. Maximum volume of blast by engine measurement, 30,800 cubic feet per minute. Average volume of blast, 23,640 cubic feet per minute. Pressure in engine-room, 7 pounds average. The lining, now being removed, is from the bosh to the top well glazed and worn uniform, leaving about 6 inches of fire-brick remaining. A piece of this wall, about 12 feet below the top, fell in, which allowed the gas to heat the shell red-hot and caused them to go out. From the bosh down the furnace is in fair order and would have run longer. The furnace is 30 feet bosh, 75 feet high, 11 feet hearth, 14 feet stock line, and has 7 tuyeres, 7 inch. The furnace is equipped with three of the largest size Whitwell stoves, which have given little trouble during the blast. The three engines have 7-foot blowing cylinders by 4-foot stroke, and were built by Mackintosh, Hemphill & Co., the well-known builders. No effort was made to make fancy days or fancy weeks, but the furnace has been held to an even, steady course, relying on the gross results at the end of the year as being better

than a large week and irregular running. The furnace worked as well the last week as any previous week. The entire blast has been run without an accident of any kind, which shows the care and good judgment exercised by the general superintendent. This blast is now placed on record as the most remarkable yet made. E.

Coal and Iron-Ore Deposits of North Carolina.

SALEM, N. C., January 18, 1884.

To the Editor of The Iron Age.—SIR: As there is so much said and written about the coal and iron-ore beds in Alabama and Tennessee, and of the wonders which have resulted in their development, I therefore thought it might be of interest to some of your readers to learn something of the wonderful resources of North Carolina, more especially about the coal and iron-ore deposits.

It has long been known that there are immense quantities of the very best coal in Stokes County, but, on account of want of transportation, it has never been worked to any extent, except during the late war, when it acquired a high reputation as fuel, but since then nothing has been done with it. This coal is semi-bituminous, and the surface indications commence about four miles west of Walnut Grove, and extend in an easterly direction down the Town Fork and Dan River for a distance of 30 miles. Near Walnut Cove the outcropping shows 14 layers at a distance of about 30 to 50 feet apart. The dip seems to be at an angle of about 45°. One vein has been pronounced by some experts to be anthracite. There is some sulphur in the surface coal, but it cokes well. There have been a few small shafts sunk near Stokesburg, but none deeper than 15 feet. A solid vein of coal 6 feet thick has been found in one of these shafts at this depth. Some of the veins have a mixture of shale and coal, but yet show a solid vein of coal from 2 to 4 feet thick. What deeper developments will reveal is unknown, but experts say that the veins will increase in thickness, also that the coal will be of much better quality deeper down. Two analyses by Dr. Genth of samples of different seams gave respectively 75.96 and 76.56 per cent. of fixed carbon, and 11.44 and 13.56 per cent. of ash, the volatile matter being about 12 per cent. each.

Now, I think the development of these deposits is a matter of sufficient interest to justify an exploration of their whole length, and the diamond drill offers a ready and efficient cheap means of tracing out these coal deposits in order to ascertain accurately the depth, thickness and all conditions which will determine their value. I believe that a few thousand dollars judiciously expended in the development of the Dan River coal fields would soon become one of the best paying investments in North Carolina, and more especially so considering the near proximity of this coal to an almost inexhaustible quantity of some of the best magnetic iron ore in the United States.

There are in the State Museum several very fine specimens of the magnetic ore and micaceous hematite from (Forsyth County) the neighborhood of Salem, and south and west of it, and there are believed to be valuable ore deposits in that section, but no definite information of their extent is at hand. However, it is well known from surface indications that these iron ores extend over a large portion of this county. In Stokes County the iron interests have been more looked into, as previous to the war and before the advent of railroads near here there were several charcoal forges and furnaces in operation there, and doing, in those days, a good business, and their iron had a fine local reputation as being the best iron our smiths could procure, and still our smiths prefer this iron to almost any other, but, owing to the primitive way in which it is manufactured, it can never be bought at less than about double what rolled iron is sold for. In order to give an idea of some of the Stokes County iron-ore deposits, I will quote from a letter recently received from one of the best-informed men on this subject in that locality. He says that "main veins of iron in Stokes County are in the neighborhood of Danbury, on the Dan River. The main veins that have been opened are north and east from Danbury, and about two miles distant. One of the mines recently cleared out shows a thickness of solid ore of from 7 to 12 feet. There are other mines on the same lode, said to be from 3 to 10 feet thick. There are two lodes 2½ miles northwest of Danbury which are said, by parties who have worked them, to be similar to the two already described; then still further to the northwest is another lode of very fine-grained ore, which is said to be very rich. Southeast from the first described lode is another vein of good quality, 8 to 10 feet thick. These are the main veins near Danbury, all of which are strongly magnetic. There are other small veins between the main lodes, all highly magnetic. In the southern part of this county is a lode of solid and hard ore, which has been traced for a distance of 20 miles and opened in several places, showing a vein of ore 3 feet thick. There are many other smaller veins. All these veins spoken of in Stokes County have been opened, and from many of them formerly our best iron was made, some of which can still be seen here. The opinion of those who worked these mines is that the supply of iron is there almost inexhaustible."

Now, when we consider the near proximity of an abundance of limestone to these iron-ore deposits, and that the Dan River coal lies almost centrally between the Forsyth and Stokes iron-ore deposits, and at only about 6 to 10 miles from either of these iron-ore beds, it does certainly seem as if nature had done her part in placing the necessary requisites in near proximity to each other in order to make this one of the great iron-producing centers of the United States, and it only remains now for men and money to develop it. Now, who will be the lucky ones? As there is now a fair prospect of one or two railroads being built directly through this iron and coal district, it will certainly not be long before some one will take hold. I am very much interested in seeing such enterprises inaugurated as will result in the development of the coal and iron regions, and will,

therefore, with pleasure answer any inquiries in regard to the same, and would be pleased to open correspondence with parties interested in such enterprises with a view to investment. Respectfully, C. A. HEGE, Proprietor of Salem Iron Works.

American "Scotch Pig."

It may not be generally known that the Brier Hill Iron and Coal Company, owning and operating blast furnaces at Youngstown, Ohio, are turning out an iron which they call "Brier Hill Scotch," and which is said to be fully equal to the imported article. The Brier Hill Company, while making a very good Bessemer iron, have for some time been paying special attention to foundry irons. Some three or four months ago they conceived the idea of making a grade of foundry iron equal to imported Scotch. The latter iron is usually purchased on account of its well-known qualities of great fluidity, slight shrinkage in casting, and scrap-absorbing power, and it is asserted that the Brier Hill Scotch is identical in physical properties with the imported Scotch, and that it is very difficult to distinguish the difference between them. The iron of the Brier Hill Company has been tried in numerous instances by parties who had been using nothing but the imported Scotch, and we are informed that, with scarcely an exception, it has filled the bill and done the work of the latter.

The Brier Hill Company are now running one of their four blast furnaces exclusively on this iron, and are shipping it to 15 different States in the Union. The iron is graded as Nos. 1 and 2, the No. 1 being extra open-grained, and the No. 2 varying but little in appearance from No. 1 imported Scotch. They use as a basis for making the metal the celebrated Mineral Ridge black-band ore, which is identical in analysis with the best qualities of Scotch black-band. The company are also making, in addition to their Bessemer pig and their Scotch foundry, two other grades of foundry iron—an extra-strength iron, called "Tod Foundry," made from Lake Superior ores, very tough, soft and fluid, and suitable for difficult machine work, and a medium-strength iron, called "Iron River Foundry," suitable for small castings and general use. Special attention is given to grading these foundry irons, and purchasers can rely on qualities and strength. The Brier Hill Company are now able to supply to foundries their entire mixture, thus obviating any necessity to buy from several different makers. The four furnaces of the company have an aggregate annual capacity of 100,000 tons, and their product for the past three years has averaged 75,000 tons per annum.

TRADE PUBLICATIONS.

Rules and Tables Relating to Wrought Iron.

Among the various trade publications there are none which possess the general value of the engineering pocket-books that are published by many of the large iron and steel working companies. Through the courtesy of Mr. W. O. Fayerweather, treasurer of the Passaic Rolling Mill Company, we are in receipt of an interesting, as well as valuable, manual compiled by Mr. F. A. Leers, C. E., containing information and tables appertaining to the use of wrought iron in engineering construction. The work, which is of the ordinary pocket-book description, is handsomely bound in red leather, is well arranged and of excellent typography, and is sold at the moderate price of \$1.50 per copy. The first 20 pages are filled with cuts showing sectional views of the I and T beams, channel bars, angle iron, bead iron, &c., which they manufacture. The rest of the book, with the exception of a few pages left for memoranda, contains rules and formulae for calculating the strength of iron beams and bars, rules for computing the size of rivets and pins used in trusses and girders, besides very full tables for finding the area, volume and weight of standard sizes of bars, plates, sheet iron, nuts, rivets, &c., to which is added a few tables of sines and tangents and the areas of small circles. Such a manual as this, without being designed to take the place of the regular engineer's pocket-book, will yet be found of great service in work of the special descriptions to which it relates.

Agricultural Implements.

Mr. A. B. Farquhar has just sent us his new illustrated catalogue and price list of the Pennsylvania Agricultural Works. These works, which are situated at York, Pa., turn out every kind of implement connected directly or indirectly with farming, ranging from those tools worked by hand up to those requiring a steam-engine to drive them. Not only does Mr. Farquhar make the ordinary farm and garden tools, including, among other things, some 30 different styles of horse plows, besides harrows, rakes, rollers, reapers, cultivators, thrashers, separators, &c., but he also makes all kinds of farming machinery, such as stationary and portable steam-engines, of the manufacture of which he makes quite a specialty. Some 10 pages of this catalogue are devoted to sawmills, of which he makes several varieties, including both circular and drag. The book is bound very tastefully in cloth, and contains rather more than 200 pages, almost every page illustrated, sometimes with four or five cuts. As giving some idea of the magnitude of the business done at the Pennsylvania Agricultural Works, which is one of the largest of its kind in the United States, it may be noted that its weekly consumption of iron averages over 150,000 pounds; of steel, 10,000 pounds, and of lumber of various kinds from 50,000 to 100,000 feet.

An important obstacle has been encountered in the construction of the Ariberg Tunnel, in France, being in the form of a bed of quicksand, which, despite all efforts thus far made, seems to effectually bar further progress. Shoring has been found useless, and as the sand is renewed as rapidly as it can be removed, the completion of the tunnel is in some quarters regarded as an impossibility.

Special Notices.

LIST OF NEW AND SECOND-HAND IRON AND Wood Working Machinery ENGINES, BOILERS, &c., ALL IN GOOD RUNNING ORDER.

FOR SALE BY

HENRY I. SNELL,
No. 135 NORTH THIRD STREET,
PHILADELPHIA.

February, 1884.

ENGINES AND BOILERS.

One 30-inch cylinder, 42-inch stroke Corliss Engine, built by Wetherill & Co.; has all modern improvements, valve motion with crab claws and dash pots, band fly-wheel, 16 feet diameter, 24-inch face, made in halves. Engine in excellent condition.

One 16-inch cylinder, 36-inch stroke Corliss Engine, built by Wetherill & Co.; band wheel, 12 feet diameter, 20-inch face; latest design of valve motion, in first-rate condition; used 5 years.

One 12-inch cylinder, 42-inch stroke Corliss Engine, made by Geo. H. Corliss; has been put in thorough order; wheel will be made new to suit purchaser.

One 16½-inch cylinder, 20-inch stroke Vertical Engine, made by Frick & Co.; nearly new and in perfect order; band wheel 8 feet diameter, 24-inch face; governor, oil cups, &c.

One 12-inch cylinder, 12-inch stroke Vertical Engine, built by New York Safety Steam Power Co.; has 3-inch Waters governor; wheel, 5 feet diameter, 12-inch face; shaft has improved ball and socket bearing; used only one year; practically good as new.

One 8-inch cylinder, 10-inch stroke Vertical Engine, with Rider's patent automatic cut off; band wheel, 18 inches diameter, 8-inch face; in good running order.

One 4-inch cylinder, 6-inch stroke Vertical Engine, built by New York Safety Steam Power Co.; picking governor; wheel, 24-inch diameter, 4-inch face; in first-rate order.

One pair of Vertical Engines, built by Fitchburg Machine Co.; cylinders, 7 x 7, mounted on one frame; cranks at right angles with shaft, and one 4 x 8 turned fly-wheel and 36 x 8 pulley; Judson governor, oil cups, &c.

Two 5½-inch cylinder, 7-inch stroke New York Safety Steam Power Co.'s Vertical Engines; used only a few hours; guaranteed good as new; wheels, 22 inches diameter, 4½-inch face.

One 12-inch cylinder, 16-inch stroke Horizontal Engine, plain slide-valve with box bed plate; 3-inch governor; wheel to suit purchaser; built by Hutchinson & Alexander, and entirely new.

One 12-inch cylinder, 15-inch stroke new Horizontal Engine, with pump and heater; built by the Supplee Steam Engine Co.; has 3-inch Gardner governor and 7-foot wheel.

One 10-inch cylinder, 14-inch stroke Horizontal Engine, new; built by the Diamond Drill Co.; has 3-inch Waters governor; band-wheel.

One 10½-inch cylinder, 36-inch stroke Horizontal Engine; has governor, pump and heater; fly wheel, 8 feet diameter, 14-inch face, in halves; used 5 years; good order.

One 7½-inch cylinder, 12-inch stroke Portable Engine, with locomotive boiler, mounted on wheels, with pole, and all running gears complete; Judson governor, pump and band fly-wheel; used 6 months.

One 6 H. P. Marine Boiler; waist, 66 inches diameter; length over all, 12 feet. Fire-box, 56 inches long; lower rows of flues contain two tubes; one 10-inch, one 6-inch tube, all 6 feet long; upper row, 31 3/4-inch tubes, 3 ft. long; complete with grates and fittings; all in good order.

One 6 H. P. Locomotive Boiler, built by J. P. Morris Co.; waist, 54 inches diameter; fire-box, 8 feet 4 inches long; 40 3/4-inch tubes, 12 feet long; vertical dome, 24 x 32 inches; complete with grates and fittings; good order.

One 25 H. P. Horizontal Tubular Boiler, 42-inch diameter, 9 feet long, with 40 3/4-inch tubes; smoke-box extension, front and fittings complete; vertical dome, 24 x 24; good order; built by Erie City Iron Works.

One 40 H. P. Horizontal Tubular Boiler, built by Wilbraham & Bros.; 48 inches diameter, 12 feet long; 59 3/4-inch tubes; full front and all fittings complete; vertical dome, 24 x 24.

One 3 H. P. Horizontal Tubular Boiler, 48 inches diameter, 10 feet long, with 40 3/4-inch tubes; full front and fittings complete.

One 60 H. P. Tubular Boiler, new, 54 inches diameter, 14 feet long, with 40 3/4-inch tubes; shell, 7½ inch best flange iron; 50,000 pounds tensile strength; double riveted; head, 2½ inch; vertical dome, 26 x 36; built in most thorough manner; complete with fittings and full fire front.

Four 60 H. P. Return Drop Flue Boilers, each 6 feet diameter, 24 feet long, with lateral fire-box and four flues 12 inches diameter, 16 feet long, and two flues 18 inches diameter, 14 feet long; shell of 11-16 inch best flange iron, and built in the most thorough manner; used only 18 months.

IRON TOOLS.

One iron planer 32 inches wide; planes 7 feet long; has cross-down and angle feed, and driven with two belts; built by Robt. Bishop.

One 16-inch Prentice drill, with lever attachment to spindle; table raises and lowers by lever; nearly new.

One crank planer, by New York Steam Engine Co.; 12-inch stroke, with quick return motion; table, 20 inches long, 15½ inches wide; countershaft and pulleys complete.

One Shaper, 11-inch stroke; has double table and traveling head; built by Richardson & Moore, Cincinnati, Ohio; has countershaft and attachments complete; splendid vise.

One 15-inch swing, 4½-foot bed Screw Cutting Lathe, with full set of change gears, rod and screw feed, steady rest, countershaft and pulleys complete; built by Fitchburg Machine Co.

One 24-inch Engine Lathe, 12-foot bed, very heavy, well-built tool; has rod and screw feed, full set of change gears, power and cross-bar, steady rest, following rest, two face plates, overhead pulleys and countershaft complete; new.

One 18-inch Engine Lathe, 8-foot bed, with screw and rod feed; full set of change gears, steady rest, face plate and overhead pulleys complete; built by New Haven Manufacturing Co.

One 36-inch New Haven Lathe, 12-foot bed, with rod and screw feed, full set of change gears, countershaft, center and following rest, large and small face plates, extra tool block to turn whole swing of lathe, wrenches, &c.

One 18-inch iron lathe, 8-foot bed, built by New Haven Manufacturing Co.; complete with rod and screw feed, full set of change gears, rise and fall rest, power cross feed, large and small face plates, center rest, wrenches, and Bean's patent toolless friction countershaft.

One No. 2 Smith & Garvin Hand Milling Machine, with adjustable vise, countershaft and pulleys complete.

One 3 Spindle Drill, built by Smith & Garvin; table raises and lowers by a lever.

One Pratt & Whitney Shaping Machine, 8-inch stroke, with quick return motion, countershaft and hangers.

One 20-inch Putnam Machine Co.'s Lathe, 14-foot

Special Notices.

bed, with full set of change gears, countershaft and pulleys.

One Peck's Drop Press, with patent lifter complete; hammer weighs 317 pounds.

A large stock of the Scientific Forge Co.'s Portable Forges, with improved friction clutch; best forge in use.

One Hydraulic Press, 10-inch ram; platen, 42 x 30; rods, 3½ inches in diameter; 8 feet between platens; 40-inch raise to ram one pump; 3½-inch plunger, with cistern tank.

WOOD-WORKING MACHINERY.

One heavy 8-inch, 4-sided Molding Machine, with brass slotted heads, countershaft and all attachments complete; built by J. A. Fay & Co.

One 6-inch, 3-sided H. E. Smith Molding Machine, complete with countershaft and pulleys.

One 36-inch heavy iron frame Band Saw, built by Colladay & Bro.; has tilting table and all late improvements.

One Band Saw, setting and filing machine, built by Atlantic Works.

One No. 1 Universal iron-frame Saw Bench, made by H. B. Smith, with adjustable table.

One Cross Cut Saw Bench, iron frame, with sliding table and boring attachment.

One iron-frame Boring Machine, Walker's patent; table has foot lever to raise and lower.

One Gray & Wood's planer, with extra feed rolls; planes 10 feet long, 24 inches wide, with countershaft and pulleys complete.

One Vertical Sand-Papering Machine, for inside work; built by J. H. White, Concord, N. H.; has rotary motion to spindle, and also vertical motion and adjustable stroke.

One Smith's Iron-frame Universal Saw Bench, No. 2, with adjustable table, countershaft, &c.

One 16-inch Wood Lathe, on iron shears 7 feet long, with T rests, centers, chuck, face plate and countershaft complete.

One 20-inch Smith's iron-frame surfacer, double belted head, countershaft and pulleys, modern build.

One Green's Improved Panel Raiser, built by Millsap & Rowley; complete with countershaft and pulleys.

One Wright's patent Scroll Saw, with attachments complete.

One Railway Cut-off Saw, with table and countershafting and belt tightener; Wright's patent.

One 24-inch Planer and Matcher, built by R. Ball & Co.; surfaces, 24 inches; tongues and grooves, 12 inches; first-rate order; countershaft and pulleys complete.

One 24-inch Heavy Planer and Matcher, built by Witherby, Rugg & Richardson; planes 24 inches wide; tongues and grooves, 14 inches wide; complete with countershaft, &c.

One 24-inch extra heavy six-roll Planer and Matcher, built by Witherby, Rugg & Richardson; planes on both sides 24 inches wide, and tongues and grooves 14 inches; has all attachments complete.

700 Pulleys, assorted sizes, 3 to 60 inches diameter.

Several second-hand Sturtevant Blowers, various sizes.

Quite a large assortment of Belt and Steam Pumps.

I am also Sole Agent for the following Manufacturers, and carry a Full Line of their Tools in Stock:

NEW YORK SAFETY STEAM POWER CO.,
Engines and Boilers.

B. F. STURTEVANT,
Blowers and Exhaust Fans.

NEW HAVEN MANUFACTURING CO.,
Machinist Tools.

SCIENTIFIC MILL AND FORGE CO.,
Portable Forges and Blacksmiths' Hand Blowers.

Second-hand Machinery Bought for Cash or Sold on Commission.

Liberal Advances Made on Consignments.

Lowest Prices on any of the above given on application.

For Sale.
ENGINES AND BOILERS.

Two Wright Automatic Cut-off Engines, 22 x 42 and 22 x 36.

Two Dexter Automatic, 40 and 150 H. P.

One 16 x 36 Slide-Valve Engine.

One 20 x 36 " "

One 10 x 24 " "

One Corliss Condensing Beam Engine, 500 H. P.

Two Horizontal Tubular Boilers, 4 ft. x 16 ft.

One Vertical Tubular Boiler, 9 H. P.

One " " " "

All the above guaranteed in good working condition.

NEWELL UNIVERSAL MILL CO.,
10 Barclay Street, New York.

STEAM PUMPS

For Sale.

A large number of Steam Pumps of all makes, and ranging in size from small tank or boiler feeds up to very heavy service machines.

While the stock lasts good bargains are open for Miners, Water Works, Rolling Mills, Furnaces, or any one needing to move fluids by steam.

Call upon or address
J. N. HINCKLEY,
Purchasing Agent of the United Pipe Lines,
Oil City, Pa.

For Sale.

The largest stock of New and Second-hand Engines, Boilers, and general Machinery in the West. Send for Catalogue. Hoisting Outfits for Coal Mining and other purposes a specialty.

WARREN SPRINGER,
195 to 219 South Canal St., Chicago.

For Sale.

Second-hand
DROPS AND LIFTERS.

BEECHER & PECK,
Lock Box 302, New Haven, Conn.

For Sale.

MACHINES
For Making Picks, Mattocks, Axes,
Solid Steel Hammers and Sledges,
with Adze Eyes or Solid-Punched Eyes.

T. & CO., Box 25,
Office of The Iron Age, 83 Beade St., New York.

WANTED—Situation by an experienced man as Foreman in an Iron Foundry, either Malicious or Gray. Is a practical Molder and Melter. Bench Molding preferred. Can give references.

Address
P. O. BOX 51,
Bernardston, Mass.

Trade Report.

BRITISH IRON AND METAL MARKETS.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, JAN. 30, 1884.

Scotch Pig.—The market continues firm and prices are unchanged. We repeat makers' prices:

Coltness, alongside, Glasgow	58/
Langloan, " "	58/
Gartsherrie, " "	54/6
Summerlee, " "	53/
Carnbroe, " "	52/6
Glenarmock, " Ardrossan	52/6
Eclinton, " "	47/
Dalmellington, " "	49/6
Shotts, " at Leith	54/

Lighterage from Ardrossan to Glasgow is 1/3 ton.

Cleveland Pig.—The market is quiet at unchanged values. We quote as follows, f.o.b. shipping ports:

Middlesboro' No. 1 Foundry	41/
" No. 2 "	40/
" No. 3 "	37/ @ 37/8

Bessemer Pig.—The market is quiet, with a little firmer feeling. We quote W. C. Hematites, 47/ for mixed lots, Nos. 1, 2 and 3, equal parts, f.o.b. shipping ports.

Manufactured Iron.—Is irregular. We quote at works:

Staff. Ord. Marked Bars	£	s.	d.	£	s.	d.
" Medium "	7	10	0	6	15	0
" Common "	6	0	0	6	5	0

Hoops, 20 W. G. and over.

" Common Best "	7	0	0	7	5	0
" Medium "	6	5	0	6	15	0
" Common "	6	10	0	6	10	0

Sheets, 20 W. G. and under.

" Ordinary Best "	8	15	0	9	5	0
" Common "	8	0	0	8	5	0

Welsh Bars..... 8 0 0 @ 8 5 7

Steel Rails.—The market is without change to note. We quote Ordinary Sections, £4 @ £4. 10/; f.o.b. shipping ports.

Old Rails.—The market is quiet and quotations are without change. We quote Old D. H.'s, £3. 10/ @ £3. 12/6, c.i.f. New York.

Scrap.—Is irregular and quotations are unchanged. We quote Heavy Wrought, c.i.f. New York, £2. 17/6 @ £3; Bessemer Crop Ends, run of the mill, are quoted 60/; f.o.b. shipping ports.

Copper.—Is a little steadier. We quote Best Selected, £63 @ £64, and Chili Bars, £56 @ £56. 10/.

Tin.—Is higher. Straits, spot, is quoted £83. 15/ @ £84. 10/; and futures, £84. 10/ @ £85.

Tin Plates.—Are a little steadier. We quote:

Tin Plates, 10 x 14, 1st qual. Charcoal	19/6 @ 21/6
" " " 2d "	18/6 @ 19/
" " " 1st " Coke	17/6 @ 18/
" " " 2d "	15/9 @ 16/3

Spelter.—The market is steady. We quote Ordinary, at shipping ports, £14. 15/ @ £15.

Lead.—Is steady. We quote Common English Pig, £12 @ £12. 5/.

Freights.—Steam from Glasgow to New York, 4/6 @ 5/; Liverpool to New York, 4/; Liverpool to Philadelphia, 5/ @ 6/6, and London to New York, 7/6 @ 9/6.

TRADE AND FINANCE.

Office of The Iron Age, WEDNESDAY EVENING, JAN. 30, 1884.

During the past week the tribulations of the Stock Exchange have received the largest share of attention in financial circles, while in the general markets the excitement growing out of recent heavy transactions in speculative commodities has not wholly subsided. On the Produce Exchange there is a more settled feeling, but the tone has not much improved. Prices are generally low, but are not held with sufficient steadiness to provoke an export movement of any unusual magnitude, and nearly all our ocean steamers go begging for freight. A disposition to buy on the part of shippers is sure to be checked by an advance, which the steady accumulations on an already full stock do not seem to warrant. In provisions the export trade is also sluggish, but as concerns hog products the falling off is only about 3 per cent., compared with last year, whereas packing at the West is considerably behind. Of cotton the quantity sent out lately is beyond the average. In regard to prospects, talk on the Produce Exchange is not altogether favorable, for, while some indulge in congratulations that the foreign demand both for wheat and corn is improving as prices now range, the weight of opinion among foreign shippers is that India and Russia are more than ever dangerous competitors, and will forestall the American grower so long as there is any departure in this market from the laws of supply and demand. We also observe in the latest advices from Buenos Ayres that the wheat crop now being harvested threatens an immense supply available for the European market. As the case stands, the remark seems well timed that if a bull movement is in contemplation, it might be prudent first to give exporters a chance—\$1 being named as the probable basis for wheat.

Among favorable signs, the prices of nearly all our leading securities are higher, as the effect of strong reaction; trade in some branches shows more activity, particularly in the line of dry goods (although several large mills manufacturing colored cottons

have been ordered on half-time), and a readjustment of wages on a more equitable basis—happily without excitement and bitterness—serves to establish confidence between employers and employed, thus imparting a feeling of increased stability in the trading community.

The number of mercantile failures reported is less than for the previous week, but somewhat in excess of those in the corresponding week last year. The Cleveland Paper Company was the most serious, with liabilities stated at \$250,000; assets, \$500,000. Daniel F. Beatty, organ manufacturer, asked for an extension, and General Jordan was appointed receiver of the Brighton Beach Railroad. In Canada the British-American Lumbering Company made an assignment with liabilities exceeding \$1,000,000. The gross clearings of our city banks the past week were \$718,943,780—a decrease of 2½% compared with the corresponding week last year. Outside of New York the clearings show a small decrease. Commercial paper, especially that which is indorsed, is in good demand. We quote 60 to 90 days' indorsed bills receivable 4½% @ 5%; four months' acceptances, 5% @ 5½%.

The weekly bank statement continues to reflect the superabundance of capital concentrated in this market, and the accumulation continues. The surplus reserve increased last week \$2,194,550, that item now standing at nearly \$19,500,000, compared with \$10,000,000 a year ago—an amount not before equaled since August, 1878—and the amount of cash on hand reaches about \$107,000,000—the largest ever reported. The Farmers' Loan and Trust Company and the National Bank of the State of New York give notice of a reduction of interest on deposits by those institutions from 3% to 2%. In the West the demand for money is restricted to ordinary necessities.

On the Stock Exchange the market was disturbed during the week by large sales of Oregon and Transcontinental and Northern Pacific, and sharp fluctuations were noted. The bears for a time were in full control. On Saturday it became known that a syndicate headed by Jay Gould had provided the Oregon and Transcontinental with money sufficient to meet pressing necessities by purchasing some 90,000 shares of Northern Pacific. This compelled the bears to cover their shorts, and on Monday the former advanced 40 points to 119, stiffening the whole list in sympathy.

Northern Pacific sold up to 49¼ regular, an advance of 6% compared with Saturday. On Tuesday the feature was a sharp demand for Manitoba, which had become oversold. To-day the market was comparatively quiet, and there was some purchasing for private investment. It was understood that Western railway difficulties would be settled without a rupture. The principal sales were in Union Pacific at 77½; Northwestern, 118; Lackawanna, 120¼; Oregon and Transcontinental, 23½; Northern Pacific, 23¼; New York Central, 114¼; Pacific Mail, 46¼; Reading, 54¼; Erie, 26¼; Central Pacific, 66¼; Canada Southern, 53¼; Lake Shore, 98¼; Louisville and Nashville, 47¼; Missouri Pacific, 90¼; Western Union, 74¼; Omaha, 32; Manitoba, 92¼. The principal advances for the day were Oregon Navigation, 3; Manitoba, 2½; Oregon Transcontinental, 1¼; Pullman, 2.

The Committee on Bankruptcy appointed by the Chamber of Commerce in November have agreed on a report, accompanied by a draft of a bankruptcy bill which incorporates the most recent features of British legislation with the Lowell bill as adopted by the House last session. The proposed procedure differs chiefly in that it enables an honest debtor to obtain the protection and relief of the court without being adjudicated a bankrupt.

In general trade, as before observed, there is an improving tendency, prices in some instances having advanced, while in most departments there is unwonted steadiness. Cotton is quiet at an advance of ¼; spot, business light. Coffee is strong at 12¼¢ for fair cargoes. In breadstuffs trading is moderate. Grain is steady, May wheat ranging in this market from 112¼¢ to 112¾¢; May corn, 64¾¢ @ 65. Leather is barely steady. Cordage—Manilla is quoted 15½; Sisal, 9½. Petroleum is firmly held, exports light. Lined and prime lard oil are a shade higher. Provisions are higher, in response to an advance in the West. Ordinary mess pork is quoted at \$15.25 @ \$17.57, checking shipments. Salt is dull. In rice there is a fair average business. Wool, slow demand and weak on the lower grades. In hops there is some activity, with values hardening. In freights the most notable event is the chartering of a steamer hence for Sebastopol with agricultural implements, the second charter of the kind on record.

The imports of merchandise at this port during the past week were unusually light, the total being but \$6,656,823, including \$2,126,718 in dry goods. The receipts of nearly all the leading items were below the average. Since January 1 the imports aggregated \$32,872,565, compared with \$35,676,241 for the corresponding period of 1883. The imports of specie amounted to \$303,108, nearly all in silver, and the exports of specie were \$655,177, principally in silver.

The exports of domestic produce from this port during the past week were on a limited scale, the total being but \$4,937,625, against \$7,344,715 for the same week last year. There was a better movement of breadstuffs, but the shipments of provisions and petroleum

were moderate and cotton small. Since January 1 the exports aggregated \$23,781,502, compared with \$28,276,837 for the corresponding period of 1883.

Foreign Exchange was quiet, but strong, the posted rates having advanced to \$4.86¼ @ \$4.89 for 60-day and demand. The advance was due to the scarcity of commercial bills.

United States bonds are firm and in some instances higher, quotations closing as follows:

	Bid.	Asked.
U. S. 4½s, 1891, registered	114¼	114½
U. S. 4½s, 1891, coupon	114¼	114½
U. S. 4s, 1907, registered	113¼	114
U. S. 4s, 1907, coupon	113¼	114
U. S. 3 per cents	109¼	—
U. S. Currency 6s, 1893	129	—
U. S. Currency 6s, 1896	131	—
U. S. Currency 6s, 1897	133	—
U. S. Currency 6s, 1898	135	—
U. S. Currency 6s, 1899	137	—

State bonds were firm. North Carolina consols sold at 83; Louisiana consols at 76; ditto, ex matured coupon, at 67; Tennessee 6s, old, at 37¼ @ 38, and ditto, mixed, at 38.

Senator McPherson's bill providing for bank circulation upon a deposit of bonds of equal par value, as required by law, has been accepted by Senator Sherman as a substitute for his own. Mr. Buckner's bill to stop the issue of paper money in small denominations encountered so much opposition that he consents to modify by providing that no paper money in sums less than \$5 shall be issued.

THE SYNDICATE DISCUSSION AGAIN.

We have received the following communication, which is sent as a brief in the case of

MANUFACTURER, JOBBER & Co.,	}
vs.	
SYNDICATE.	

Patent Gimlet-Pointed Wood Screws.

	Dis. per cent.
Iron, Bright, Flat Head.....	70
" " " Special sizes.....	72½
" " Round Head Piano.....	67½
" " " "	68
" Blue, Flat Head, (add 3% amount of Invoice).....	70
Iron, Blued, Round Head Piano.....	67½
" " " "	68
Felco, Flat Head.....	68
Pinned Head.....	68
Japaned, Flat Head.....	\$3.10
" " Round Head.....	\$3A10
Tinned, Flat Head, (add 10 cents per pound).....	68
" " Round Head.....	68
Lacquered, Flat Head, add 35 cts per gross.....	68
" " Round Head.....	68
Bronzed, Flat Head.....	68
" " Round Head.....	68
Brass Plated, Flat Head.....	68
" " Round Head.....	68
Copper Plated, Flat Head.....	68
" " Round Head.....	68
Silver Plated, Flat Head.....	68
" " Round Head.....	68
" " Flat Head (Burnished, add 80 cents per gross).....	68
Iron, Silver Plated, Round Head (Burnished, add 80 cents per gross).....	68
Iron, Brass Capped, Burnished.....	40
" " Silver.....	40
Nickel Plated, Flat Head, Burnished.....	50&6
" " Round Head.....	50
Iron, Continental, Flat Head.....	80
Brass, Flat Head.....	70
" " Round Head.....	60
Silver Plated, Flat Head (Burnished, add 80 cents per gross).....	68
Brass, Silver Plated, Round Head (Burnished, add 80 cents per gross).....	68
Brass, Nickel Plated, Flat Head (Burnished, add 80 cents per gross).....	68
Brass, Nickel Plated, Round Head (Burnished, add 80 cents per gross).....	68
Brass, Lacquered, Flat Head (add 35c. per gro.).....	68
" " Round Head.....	68
" " Bronzed, Flat Head.....	68
" " Round Head.....	68
Copper, Flat Head.....	68
" " Round Head.....	68
Bronze, Flat Head.....	68
" " Round Head.....	68
Phosphor-Bronze, Flat Head.....	40
" " Round Head.....	30
<i>Machine Screws, Bolts, Rivets and Miscellaneous Goods.</i>	
Machine Screws.....	Dis. per cent.
Iron, Flat Head.....	55
" " Round Head.....	50
" " Filister Head.....	45
Brass, Flat Head.....	45
" " Round Head.....	50
" " Fillister Head.....	45
Taps, for Machine Screws.....	40
Tire Bolts, Norway Philadelphia.....	75
" " Bay State.....	68
Sleigh Shoe Bolts.....	75
Stove Bolts, Flat Head.....	60
" " Round Head.....	57½
Sink Bolts.....	68
Pointed Wires.....	68
Rivets.....	68
Tapped Nuts.....	30
Ordinary, in bulk.....	45
Copper.....	45
Thousand.....	45
Thousand, in papers.....	45
Block and Carriage, in papers.....	45
Hame.....	45
Suit, or with Burns.....	45
Screw, or Rivets.....	45
Coach Screws.....	75
Hand Rail Screws.....	70
Jewel Screws.....	65
Wire Goods.....	70&10
Wire Nails.....	80
" Iron Escutcheon.....	80
" Brass Escutcheon.....	80

There seems to be a question whether the manufacture of Wood Screws has become established by inheritance, prescription or otherwise as a divine right. Pending its solution, disturbing elements are to be expected in the market. We neither claim for ourselves, nor admit the title of others to, the right described, but we have the American tendency to remain in the field while the disturbance continues. "Providence permitting," and with the continued favor of our customers, we will proceed as usual with the manufacture of Wood Screws. We propose to issue circulars on the first of each month, making prices at that time upon purchases made during the month next preceding. We feel sure that our customers will approve this course, as we shall not depart from the principle of square dealing we have always endeavored to maintain in our business. We have taken this position in order to meet the various prices which are bound to be put in circulation, and we feel that our mutual interests will thereby be

INEQUALITIES IN THE LOCK LIST.

Closet Locks.	
2, Com. Rim Del. Iron Bolt and Key.....	\$1.16
2 1/4, Com. Rim Del. Iron Bolt and Key....	2.10
2 1/4, Com. Rim Del. Brass Bolt and Key....	3.60

Rim Latches.			
2	2 1/2	1 Iron Bolt.....	1.16
2	2 1/2	" " and Slide Bolt.....	1.40
2	2 1/2	1 Iron Bolt.....	1.70
2	2 1/2	" " and Slide Bolt.....	1.90
2	2 1/2	1 Brass Bolt.....	2.30
2	2 1/2	" " and Slide Bolt.....	3.00
Common Rev. Rim Locks, 1 Tumbler—Upright.			
2	3 1/4	Iron Bolt and Key, no Stop.....	1.88
2	3 1/4	Brass Bolt and Key, no Stop.....	3.96
2	3 1/4	Iron Bolt and Key, with Stop.....	1.94
2	3 1/4	Brass Bolt and Key, with Stop.....	4.02
2	3 1/4	Iron Bolt and Key, with Thumb Bolt.....	5.66
2	3 1/4	Brass Bolt and Key, with Thumb Bolt.....	8.28
2-Change Rev. Rim Locks, 1 Tumbler—Upright.			
2	3 1/4	Iron Bolt and Key, no Stop.....	2.18
2	3 1/4	Brass Bolt and Key, no Stop.....	4.26
2	3 1/4	Brass Bolt and Steel Key, no Stop.....	4.26
2	3 1/4	Iron Bolt and Key, with Stop.....	2.34
2	3 1/4	Brass Bolt and Key, with Stop.....	4.38
2	3 1/4	Brass Bolt and Key, with Stop.....	4.32
2	3 1/4	Iron Bolt and Key, with Thumb Bolt.....	2.88
2	3 1/4	Brass Bolt and Key, with Thumb Bolt.....	5.66
2	3 1/4	Brass Bolt and Steel Key, with Thumb Bolt.....	5.66
Common Rev. Mortise Locks, 1 Tumbler.			
2	3 1/4	Iron Front, Strike-Bolts and Keys.....	1.92
2	3 1/4	Brass Front, Strike-Bolts and Keys.....	4.06
2	3 1/4	Iron Front, Strike-Bolts and Keys.....	2.80
2	3 1/4	Brass Front, Strike-Bolts and Keys.....	5.60
12-Change Mortise Locks, 1 Tumbler.			
2	3 1/4	Iron Front, Strike-Bolts and Key.....	2.22
2	3 1/4	Brass Front, Strike-Bolts and Key.....	4.36
2	3 1/4	Iron Front, Strike-Bolts and Key.....	3.10
2	3 1/4	Brass Front, Strike-Bolts and Key.....	5.10
Change Mortise Locks, 1 Tumbler.—Flat Steel Keys.			
2	3 1/4	Iron Front, Strike and Bolts.....	4.20
2	3 1/4	Brass Front, Strike and Bolts.....	6.80
2	3 1/4	Iron Front, Strike and Bolts.....	5.70
2	3 1/4	Brass Front, Strike and Bolts.....	7.70
Mortise Latches.			
2	3 1/4	Iron Front and Bolt.....	1.40

We invite attention to the within catalogue and price list of improved Carpenters' ma-

	Dis. per cent.
Awl Hairs.....	40
Awls, Patent, Folding.....	35
Brad Awls, Handled.....	35
Bevels, Sliding T.....	55
Patent Flush Eureka.....	30
T. B. Balfour.....	20
Box Scraper, Adjustable.....	30
"Victor" Adjustable.....	35
Chalk-line Reels and Awls.....	35
Carpenter's Tool Handles.....	35
Countersinks, Wheeler's Patent.....	20
Dado, Filletster, Plow, &c., combined.....	30
Adjustable.....	35
Gauges.....	25
Handles.....	25
Plane.....	40
Saw.....	40
Screw Driver.....	25
Hammers.....	25
Tack No. 4.....	25
Steak.....	25
Upholsterers.....	25
Level Glasses.....	10
Nails, Hickory and Lignumvitae.....	10
Plaster Box, Improved.....	30
Squares, Improved.....	30
Try Squares, Improved.....	65
Plumbs and Levels.....	35
Patent Adjustable.....	65
Nicholson's Patent.....	30
Iron Frame.....	30
Steel.....	30

Jack Levels	65
Planes, Bailey's Adjustable Iron and Wood	30
" " Stanley Adjustable Iron and Wood	30
" " Leonard Bailey & Co.'s "Victor" Adjustable	30
Planes	30
" " Rabbit	30
" " Bull-nose Rabbit	30
" " Tonguing and Grooving	30
Plane Irons	30
Flow, Beading Tool, &c., Combined	30
" " and Matching Plane, combined	30
" " and Matching Plane, combined	30
Plumb Bobs, Adjustable	30
Rules, Boxwood, Stanley's	70
" " Ivory, Stanley's	50
" " Miscellaneous, Stanley's	50
" " Miscellaneous, Stanley's	50
Sash Cord Irons	35
Scratch Awls, Handled	35
Screw Drivers, Varished Handles	30
" " Black Handles	30
Spoke Shaves	30
" " Shave Cutters, Bailey's	30
" " Shaves, "Victor"	30
" " Shave Cutters, "Victor"	30
Strammel Points	30
Tool Handles and Tools, Excelsior	30
Try Squares	30
" " Improved, Iron Handle	30
" " Adjustable, Iron Handle	30
" " Inlaid	30
" " Plumb and Level	30
" " Square and Level, Combs	30
" " and Mitre Square, Winterbottom's	30
General Scrapers	30

hundred and twenty-five names have been enrolled as members, and it is confidently expected that this number will be doubled within the next 30 days. The membership price is \$1 a year, but the reading-room is free to all. On the opening night 1000 books will be in possession of the library, of which upward of 300 are entirely new. We should be pleased to hear of similar movements where there are large numbers of operatives.

The death of Mr. Albert G. Angell, which occurred at Dayton on the 11th inst., is a bereavement for his family and friends. He is in an especial manner a great loss to his company, of which he was president. Mr. Angell came here from the East two years ago, on the invitation of some of the present company, who were creditors of the Hayes Screw Company, to reorganize and revive the former business, and to accept the presidency of the new concern and to manage its affairs. He accepted their proposition, and entered upon the work February 1, 1882. What he has accomplished in so short a space of time since that date is apparent in the present condition of the new works at Dayton, and it will remain attested his great ability as an organizer, and his skill, almost amounting to genius, as a manufacturer. We owe to his methods and his characteristic love for one of the most complete establishments in the country, to the success of which he devoted himself with untiring energy to his latest hours. In personal intercourse Mr. Angell was a courteous gentleman, beloved by his employees, respected

A. S. WINSLOW,
Secretary of the Board.
CATALOGUES.

They mention the following among other points of excellence in the construction of this Fence : That the pickets pass through each, and extend below the bottom rail ; that each picket is secured at the junction of each rail by a portion of the rail being compressed into a notch in the picket ; that in producing these notches they remove no material, and consequently the picket is not weakened, and that the pickets do not depend on the ornaments for support, but are secured independently of the ornaments. Referring to the fact that the frost will move fences more or less, whether on stone or cast-iron bases, they mention that they make all their Fences so that they can be put in perfect line at any time without disturbing the foundation. The

No. 1, Plain Hose Reel, medium size,
carrying 100 feet $\frac{1}{2}$ -inch Hose.

No. 2, Hose Reel and Lawn Sprinkler combined, carrying 100 feet $\frac{3}{4}$ -inch Hose.

No. 3, Plain Hose Reel, large size, for carrying 200 feet $\frac{3}{4}$ -inch or 100 feet 1-inch Hose.

No. 4, Hose Reel and Lawn Sprinkler combined, carrying 200 feet $\frac{3}{4}$ -inch or 100 feet 1-inch Hose.

The pamphlet also illustrates the Buckeye Lawn Mower "Senior" and "Junior," which is sold to the trade at a discount of 30 and 5 per cent. The manufacturers advise us that the prospect this year is better than ever before, and a good trade is anticipated.

The catalogue of Roller Skates manufactured by M. C. Henley, Richmond, Ind., has also come to hand, and illustrates very satisfactorily the fine line of goods of which he is the manufacturer. In addition to illustrating the various styles of Skates, it has a catalogue of the different parts which are required for repairs, and of other articles which may be desired in connection with these goods, such as Oil Cans, Pliers for Rinks, Skating Caps, Gold and Silver Badges for Rink Prizes, Copies of Rink Rules, Admission Tickets, &c. The pamphlet also contains extracts in which the use of Roller Skates is recommended, and their benefits mentioned. The whole list is very tastefully gotten up and well printed.

We have received a circular showing the merits of the "R. Mushet's Special Steel" from Messrs. B. M. Jones & Co., 11 and 13 Oliver street, Boston, who are representatives of Taylor Brothers & Co., of Leeds, and Samuel Osborn & Co., of Sheffield. The circular referred to is made up in a very neat little pamphlet of 20 pages, containing testimonials from many of the leading steel consumers of the United States.

The catalogue of the Page Belting Company, Concord, N. H., has come to hand, and, besides the price list of the goods they manufacture, contains an interesting account of the process of Belt-making. It begins with the tanning, after which follows an illustrated description of the different stages of the manufacture until the finished belting is produced. It contains also information with reference to different kinds of belting and Driving Belts, and gives some practical rules concerning shafts and pulleys and suggestions as to the purchasing, putting on and taking care of Belts. The pamphlet is neatly printed, and will be found of interest to those who desire such information.

Lamson, Sessions & Co., Cleveland, Ohio, have issued their price list of the Belts, Mats, &c., which they manufacture. It contains both the old and the new Carriage Belt list and the Standard and Philadelphia lists, as well as the prices on the whole line of goods which are made by them. As they have made additions to the goods heretofore manufactured by them, they invite the attention of the trade to their list and illustrations. The catalogue, which is well got up, closes with representations of labels and colors, as they are used to designate different qualities of goods.

The reports which come to us from different sources speak encouragingly of

SOUTHERN TRADE,
I represent it as increasingly extensive
and satisfactory. A good deal of Northern
capital and enterprise are there finding a
profitable field. In this connection we may
mention that we have received a circular

We have received the following communication from the Mosler Manufacturing Company, Cincinnati, Ohio, referring to notices which were published in our last issue relative to alleged infringements :

CINCINNATI, JANUARY 28, 1884.

To the Editor of The Iron Age: In reply to articles which appear in your recent publication, wherein the Kilbourn & Jacobs Manufacturing Company threaten to bring suit against purchasers and users of our goods, we desire to say that all the goods manufactured by us are amply protected by Letters Patent, owned and controlled by our company, and we are well satisfied that we do not infringe upon any existing patents, and especially upon any owned by the Kilbourn & Jacobs Manufacturing Company.

In support of this we append the opinion of one of the most prominent patent attorneys in the State of Ohio, after having given the matter the most thorough examination. Since we have commenced the manufacture of our special line of goods we have obtained an enviable reputation in the market, and we are not surprised at the effort of an envious rival to stay the demand and check the rapid sale of our work at lower prices. We will, however, assure our customers that they will run no risks in continuing to purchase from us, as we will protect and hold them harmless against any suits brought against them for using our lines of goods. We remain,

Very respectfully,

THE MOSLER MFG. CO.

The following is the letter of their attorney which is referred to in the above communication :

CINCINNATI, December 19, 1884.
Mosler Manufacturing Company, Cincinnati, Ohio.—DEAR SIRS: I have carefully examined the Jacobs patents submitted to me in connection with the goods you manufacture under and in accordance with the Letters Patent owned and controlled by your company, and am clearly of the opinion that you do not in any manner infringe upon any patents owned or controlled by the Kilbourne & Jacobs Manufacturing Company, of Columbus, Ohio. You need pay no attention to the threatened suits, for if brought, as they may be, it will be for advertising purposes only, and I am positive they cannot succeed against you in the courts.

(Signed) Yours truly,
GEO. J. MURRAY.

The following are the prices of the Willis
Map Spout, an article which is sold by
Charles Millar & Son, Utica, N. Y.:
Canned per 100 \$2.00

.....	\$8.00
.....	2.50
ordered in lots of 1000.....dis.	5 %
" " 9000.....	10 %
" " 5000.....	15 %
Terms cash, 60 days from March 1.	

The manufacturers state that this Sapout is supplied to meet the demand for such an article, and at a price that will be satisfactory to the consumer, while the dealer is given a good margin for handling it.

We would direct the attention of Hardware merchants to the advertisement of Charles O. Le Count, 29 Chambers street, New York, who offers his services as a purchaser of Hardware. Mr. Le Count is well known among the trade here and has many friends, and refers, as our readers will perceive, to some of the leading houses in the city.

The Patent Ratchet Spring Hinges which
are illustrated in the advertisement of
SARGENT & CO.,

be sold from the following list, which is subject to a discount of 50 per cent., with an extra 10 per cent. for prompt cash.

Angle-Acting, Swing One Way. Adjustable Tension, Either Right or Left Hand.

No. 125, 3 inch, Tuscan Bronzed, Tinned Spring, without Screws. Per doz. pairs....	\$3.00
No. 295, 3 inch, Tuscan Bronzed, Tinned Spring, Packed with Screws. Per doz. pairs.	3.75

These goods are packed half dozen pairs in a box.

Double-Acting, to Swing Both Ways. Adjustable Tension, Either Right or Left Hand.

No. 1135, 8 x 1 1/4 inch, Tuscan Bronzed, Tinned Spring, without Screws. Per doz. pairs....	\$6.00
No. 1125, 8 x 1 1/4 inch, Tuscan Bronzed, Tinned Spring, without Screws. Per doz. pairs....	6.35
No. 1235, 8 x 1 1/4 inch, Tuscan Bronzed, Tinned Spring, packed with Screws. Per doz. pairs.	6.75
No. 1245, 8 x 1 1/4 inch, Tuscan Bronzed, Tinned Spring, packed with Screws. Per doz. pairs.	7.00

quarter dozen pairs of these numbers are packed in a box.

The copartnership heretofore existing under the name of Macomber, Bigelow & Swase was dissolved on the 1st of January mutual consent, and a limited partnership formed under the firm name of Bigelow & Swase, in which J. F. Macomber is a special partner. The affairs of the late firm will be settled by the new firm, who will carry on the business as before at 229 Franklin street, Boston.

In the mention which was made last week of the Champion Gear, manufactured by the Champion Gear Company, of Lockport, N. Y., a misleading reference was made to "elastic iron face"—which would give the impression that the article is constructed of iron. The correct reading is "elastic face," the springs, we need not say, being made of steel. Our readers will note the correction.

Our readers will observe the advertisement of W. P. Kellogg, Troy, N. Y., who is represented in this city by the Ross & Clark Association, 97 Chambers street, New York, who are authorized to give to the

trade the manufacturer's best terms in the line of Curry Combs and other goods which he makes.

T. B. Burke, 100 Chambers street, New York, has just added the following agencies to those which he has previously mentioned as held by him: The Cincinnati Barbed-Wire Fence Company, Cincinnati, Ohio; the Mosler Manufacturing Company, Cincinnati, Ohio; and the Ironton Hoe and Tool Company, Ironton, Ohio. On all these goods Mr. Burke will be headquarters, and authorized to give the manufacturers' best prices.

Among the special notices on another page will be found one of the Lester & Lyman Manufacturing Company, in which they call attention to the fact that they are offering a considerable quantity of Socket Riveted Hoops on specially low terms; and among the advertisements in this issue will be found on page 12 that of J. Mann & Sons, Buffalo, N. Y., in which they offer the sizes of Heavy Strap Hinges which they manufacture at a discount of 70 per cent.

IRON.

American Pig.—The transactions in Foundry Irons in this market during the past week have not aggregated so large a quantity as in either of the two preceding weeks. The leading sellers have booked orders in the neighborhood of a thousand tons a day, but others have not been so well favored, and some report business very quiet. Nevertheless, there is a good tone to business, and inquiries are reported from buyers who have for months been strangers to this market. Central New York has lately been supplied from other points, but for some reason consumers in that section are again looking in this direction. It is also stated on excellent authority that Southern Foundry Irons are not now available for delivery at New England ports, the demand from nearer markets evidently being sufficient to absorb the supply. Retail dealers report the demand from small consumers a trifle better than it has been. The recently published official statement of Pig Iron stocks in makers' hands on the 1st of January shows that stocks of Anthracite Irons were practically the same on that date as they had been on the 1st of November, while the stocks of Bituminous Irons increased only 25,000 tons. There was a heavy increase in stocks of Charcoal Irons, but that will have little effect on this market, in which Anthracite Irons are chiefly sold. The statement referred to is therefore a favorable one for the Pig-Iron producers of this locality, and confirms the strength of their position. Prices are unchanged, but there are intimations that a slight advance will shortly be made by those who have been selling the most iron in this market. Forge Irons have not been specially active during the week under review, but inquiries are being made by parties who evidently mean to buy. Large lots are called for. The range of prices for No. 1 Foundry Irons has been from \$20 to \$21 at tidewater, with sales of special brands or retail lots at various prices up to \$22; No. 2 Foundry, \$19 to \$19.50 at tidewater; Gray Forge, \$16.50 to \$17.50 at furnace, equal to \$17.50 to \$18.50 at tidewater.

Scotch Pig.—As the advance in Scotland appears to hold up very well and freights are still stiff, prices here continue firm. The experience of sellers varies considerably, some of them reporting a good volume of business, while others are unable to accomplish any sales at present rates. Arrivals continue light. We make the following quotations for No. 1 Iron, with the remark that some brands may command higher prices than are here given, according to time of delivery: Coltness, \$22.50; Shotts, \$22.50; Langloan, \$22.25 to \$22.50; Summerlee, \$21.50; Dalmeny, \$20.50; Clyde, \$20.25; Gartsherrie, \$22.50 to \$23 from yard, \$21.75 to arrive; Eglington, \$20.25 to arrive; Carnbroe and Glenarnock, \$22.50 from yard and \$22 to arrive.

English Bessemer Pig.—Some inquiry is reported, but the parties are unable to come to terms. Sellers ask \$20 for spring delivery, but buyers offer \$19.

Spiegel Eisen.—No transactions have come to our notice during the past week. A spot lot of 20 % is held at \$29.50, f.o.b. cars. Lots for shipment are offered at \$28.25 to \$28.50.

Bar Iron.—Our report of last week could almost be duplicated so far as the general situation was therein described. A little more movement is discernible in some directions, and large buyers are taking advantage of the situation to a greater extent than has been the case for some time. Mill prices are firmer and store prices are fairly sustained. We quote as follows: Best Refined, 2.2¢ at 2.3¢ from store, and 1.85¢ at 2.1¢ at mill; Common Iron, 2¢ at 2.1¢ from store, and 1.7¢ at 1.75¢ at mill.

Structural and Shaped Iron.—Little new business has transpired during the past week, but prices are quoted as before, viz.: Beams, 3.5¢ on wharf for round lots; Angles, 2.4¢ at 2.6¢ from store; Tees, 3.2¢ at 3.5¢ from store.

Plate Iron.—Business is dull at the moment, but we hear of no weakness in prices, which are about as follows: Common or Tank, 2.4¢ at 2.6¢; Refined, 2.7¢ at 2.75¢; Shell, 3¢; Flange, 3.5¢ at 4¢; Extra Flange, 4.5¢ at 5¢.

Sheet Iron.—Business is improving from week to week. Not only are Heavy Sheets more active, but Light Sheets are also in much better demand. Prices are fairly sustained, though we hear of efforts being made by a Western manufacturer to secure larger orders in this market by offering somewhat better terms than the regular quotations. For Nos. 10 to 16 we quote 3¢ at 3.2¢. Lighter sizes are quoted in our New York Wholesale Price List.

Steel.—An increased volume of business is reported, but it is hardly sufficient to base strong hopes of early activity upon. Some of it is the result of keen competition with foreign Steel, the decreased consumption of the American product causing the domestic manufacturers to look for customers among those who have steadily persisted in using the foreign article. In these transactions there is said to be no profit to the American manufacturer, but nevertheless the trade is looked after very particularly. Competition among the makers of Steel Boiler Plate is growing sharper, and one establishment has, through its local agent, offered Open-Hearth Plates at 4¢ for Shell, 4.5¢ for Flange and 5¢ for Fire-Box. We quote American Tool Steel at 10.5¢, with a concession to large buyers; Crucible Machinery, 6.5¢ at 7¢; Bessemer and Open-hearth Machinery, 3.5¢ at 4¢; Toe-calk, 3.5¢ at 3.75¢; Sleigh-Shoe, 2.5¢; Boiler Plates, 4¢ at 5¢, with extra for special sizes; English Tool, 15.5¢.

Wire Rods.—There are inquiries in the market, but we hear of no actual business of consequence. We quote Steel Rods at \$45.

Steel Rails.—One company report sales of 30,000 tons during the past week. It is stated that they were almost entirely for Southern railroads, and that the price realized was from \$34 to \$35 at mill. Other companies intimate a quiet condition of business, with few inquiries. A small sale of Steel Rails was made for delivery in Cuba. We quote \$34, at mill, in Eastern Pennsylvania, as the present asking price for deliveries in the summer and fall.

Old Material.—In Wrought Scrap the past week has witnessed a limited movement, possibly 100 tons having been sold from yard at 1¢ 3/4 lb. The inquiry is light. Of Old Rails, 500 tons have been sold at \$21, delivered at New Haven. Some 2000 tons have also changed hands at \$20.50 to \$21.50, delivered at other points in this vicinity. For a spot lot of 200 tons, \$22 was bid and refused. We quote harbor delivery nominally as before, \$21.50 to \$22.

TRANSACTIONS ON THE NEW YORK METAL EXCHANGE.

The following transactions are reported to us as having taken place on the floor of the Exchange from Wednesday noon of last week to Wednesday noon of this week:

WEDNESDAY, JANUARY 23.—Second Call.	
No transactions.	
THURSDAY, JANUARY 24.	
10 tons Domestic Lead, Feb.	\$0.04 1/2
FRIDAY, JANUARY 25.	
10 tons Straits Tin, April.	18.35
SATURDAY, JANUARY 26.	
No transactions.	
MONDAY, JANUARY 28.	
No transactions.	
TUESDAY, JANUARY 29.	
25 tons Straits Tin, Jan. Feb.	18.40
30 " " " Feb.	18.45
WEDNESDAY JANUARY 30.—First Call.	
No transactions.	

The above recorded sales present a total of 65 tons of Tin at 18.35¢ to 18.45¢; and 10 tons of Lead at 4 1/2¢. In Pig Iron no transactions occurred.

METALS.

Copper.—There is a good deal of strength and confident feeling in our Copper market. The export in 1883 has been larger even than was supposed, some 18,000 tons of 2240 lb. and as consumption has been 35,000 tons, the output of 53,000 tons has been drained. The available stock is thus reduced to a minimum, so that any extra demand for Lake would require shipments thence this way by rail. Of course the present price of 15¢ for Lake would not attract them, and we should forcibly have to advance a trifle. The export in 1883 has been 12,000,000 lb. Lake, 4,000,000 lb. other brands, and between 22,000,000 and 24,000,000 lb. pure in the shape of Ore and Matte, equal, as stated above, to about 18,000 tons instead of 15,000 tons previously estimated. The sales have been, during the week under review, 75,000 lb. Lake at 15¢, and 300,000 lb. other brands at 14 1/2¢ to 14 3/4¢. London is in a bad way, a sort of panic for which we do not find any particular reasons, for from this country at least not much will be shipped for some time to come. Yesterday London cabled Chili Bars, £56, and Best Selected, £62. Since then we receive, this afternoon, the ensuing dispatch per cable: "Market a little steadier. Best Selected, £63 to £64, and Chili Bars, £56 to £56 10/16." Messrs. W. T. Sargent & Son, London, January 11, say: "Chili Bar Copper under £65 1/2 ton must be considered abnormally cheap."

LOWEST PRICE DURING A DECADE.			
1874	1875	1876	1877
274.10	274.10	274.10	274.10
79.10	79.10	79.10	79.10
71.10	71.10	71.10	71.10
1877	1878	1879	1880
55	55	55	55
1881	1882	1883	1884
56	56	56	56

CHARTER ON THE WEST COAST.

Tons.			
1877	1878	1879	1880
44,000	44,000	44,000	44,000
48,000	48,000	48,000	48,000
50,000	50,000	50,000	50,000
41,500	41,500	41,500	41,500

Manufacturers may be quoted as under: Bottoms, 24¢; Braziers, 24¢; Sheeting, 23¢, and Bolt Copper, 24¢.

Tin.—London is on the upward track once more, at least for the moment, and writes Straits Tin £83.15, while Singapore comes £84.10, cost and freight per steamer to New York. Our market has been buoyed up somewhat by this favorable change, and in Straits Tin, large lines, has recovered to 18 1/2¢ at 18 3/4¢; jobbing rate, 18 1/4¢. L. and F. is nominally worth 21¢. We receive today the ensuing cable message: "Tin is higher; Straits, spot, quoted £83.15/16 @ £84.10/16 @ £85." Messrs. W. T. Sargent & Son, London, January 11, say, after the stereotyped wail about Cornwall: "It has to be remembered that the workings in the Malay Peninsula are from alluvial deposits, which, when worked energetically, become totally exhausted, and fresh deposits have to be found continually. In Australia, a few years ago, the formation of public companies happened, unfortunately, to be almost simultaneous with the disappearance of the deposits, and the quantity of 40,000 tons per annum that was confidently predicted as a minimum, has turned out a modest 4000 tons, or thereabouts."

Production.

Quinquennial period, 1874 to 1878, tons, 159,737.

1879 to 1883, " 308,381.

Increase 90 %.

Average Price of Straits Tin During a Decade.

1874 £38. 0/ 1879 £72. 0/

1875 85. 0/ 1880 87. 0/

1876 74. 0/ 1881 92. 10/

1877 68. 0/ 1882 102. 10/

1878 61. 10/ 1883 93. 5/

Lowest in 1878, £32. 10/.

Tin Plates.—Have been very quiet, we may say heavy, at the following closing rates for large lines, ordinary brands, 7 box: Charcoal Bright, \$5.50 to \$5.75; do Ternes, \$4.87 1/2 @ \$5.12 1/2; Coke Tin, \$4.75 to \$4.80; and do Ternes, \$4.75. Liverpool, on the contrary, is very firm, and even buoyant, cabling Charcoal, 17/10 to 16/6, and Coke, 15/3 to 15/6. From London we are informed that the market is a little steadier.

Lead.—Has become stagnant and featureless. We hear of no larger sales since our last, but it is given out that \$3.90 has been accepted for some Common Domestic; the nominal closing figure is 4¢. St. Louis is nominally \$3.60, to \$3.70 for hard and soft respectively. From London we learn by cable that there is no change in the market. Manufacturers are quoted as follows: Lead Pig, 6 1/2¢; Sheet Lead, 7 1/2¢; Tinned Lead Pipe, 15¢ 3/4 lb. and Block-Tin Pipe, 45¢, less the usual discount to dealers.

Spelter and Zinc.—Common Domestic Spelter has remained inactive at 4 1/2¢ @ 4 3/4¢. We quote Bertha Refined, 8¢, and Sheet Zinc, 5 1/2¢ @ 5 3/4¢, at which it is dull. From London we are informed per cable that the market is steady, with no change in prices.

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending Jan. 30, 1884.

Hardware.	
Blackie, Hill & Brown, Mach'y, pkgs., 55	
Baker Hermann & Co. Hardware, cutlery and guns, pkgs., 67	
Clark Mill End Co. Mach'y, cs., 2	
Degrauw, Aymar & Co. Mlcs., cs., 5	
Chains, 2	
De laque Emil, Cases, 9	
Delongue Louis & Co. Mach'y, cs., 5	
Drexel, Morgan & Co. Cases, 16	
Dutto P. Machines, case, 1	
Field Alfred & Co. Cases, 2	
Anvils, 6	
Chains, cks., 6	
Sickles, 136	
Spades, blades, 17	
Folsom H. & D. Arms, cs., 6	
Gordon S. Mach'y, case, 1	
Bales, 9	
Graef Cutlery Co. Cutlery, cs., 4	
Hensel, Bruckmann & Co. Rifles, case, 1	
Huston Wm. Mach'y, cs., 8	
Levi Bros. Cases, 2	
McCoy & Sanders, Case, 1	
Merch. Disp. Co. Arms, case, 1	
Cases, 2	
Moss F. W. Files, case, 1	
Mulford, Cary & Conklin. Nails, bags, 347	
Mutual Ins. Co. Ironware, cs., 14	
Moore's Sons J. F. Arms, cs., 14	
McMahon J. S. & Co. Billets, 1208	
Cases, 7	
Schroverling, Daly & Co. Arms, cs., 17	
Gun barrels, cs., 2	
Smith Alexander & Sons, Mach'y, cs., 31	
Struller, Lau & Co. Bundles, 85	
Bars, 8	
Von Cleff & Co. Bundles, 961	
Bars, 130	
Cases, 7	
Wienusch, Hilger & Co. Hardware and cutlery, pkgs., 27	
Chains, cks., 30	
Winchester Arms Co. Mlcs., cs., 12	
Witte John G. & Bro. Cutlery, cs., 17	
Order. Shovel blanks, pgs., 45	
Arms, case, 1	
Cask, 1	
Steam winch, 1	
Mach'y, cs., 5	
Mach'y, pkgs., 2	

Steel.

Brown Wm. Bales, 6

Bundles, 128

Box, 1

Cary & Moen, Casks, 45

Curran John, Cask, 1

Drexel, Morgan & Co. Steelware, cs., 6

Duval H. R. Plates, 132

Case, 1

Jackson R. D. & Co. Tubes, cs., 14

Merchants' Disp. Co. Bundles, 154

Moss F. W. Bundles, 105

Bars, 27

Naylor & Co. Billets, 1208

Cases, 3

Flock & Co. Car wheels, tires, 61

Wire, coils, 206

Sanderson & Son, Bundles, 7

Temple & Lockwood, Bundles, 85

Bars, 8

Wagner W. F. Bundles, 961

Bars, 130

Cases, 7

Wolff R. H. & Co. Wire rods, pkgs., 993

Order. Sheets, 86

Old spring, lot

Billets, 14

Rods, coils, 56

Rails, 1066

Cases, 14

Casks, 13

Wire, coils, 400

Bars, 4

Bands, 250

Metals.

Am. Powder Manuf. Co. Gun caps, cs., 5

Bank of Montreal, Tin, bxs., 790

Behn, Meyer & Co. Tin, slabs, 1762

Bond, Parsons & Co. Ingots, 993

Bruce & Cook, Tin andterne plates, bxs., 458

Canada Bank of Commerce, Tin plates, bxs., 2248

Donnington R. F. Tin plates, bxs., 719

Solder, cs., 20

Green A. L. Zinc ash, cks., 7

Hall W. & Co. Tin, slabs, 596

Hensel, Bruckmann & Co.	
Gun caps, case, 1	
Katz Bros. Tin, slabs, 737	
Krick, Gould & Co. Brass 7 foundings, cks., 8	
Brass 7 foundings, cks., 8	
Montell F. J. & Sons, Brass box, 1	
Brass, cask, 1	
Phelps, Dodge & Co. Tin plates, bxs., 12,311	

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the week ending January 29, 1884.

Dutch West Indies.

Ptms., gals., 2961

Sew. ma., case 1

Hdw., cs., 5

135

Bremen.

Ptms., gals., 749,624

Ag. imp., pkgs., 11

429

Mach'y, pkgs., 8

3,480

Scales, cs., 2

55

Mf. iron, pkgs., 9

363

Rotterdam.

Ptms., gals., 225,452

21,418

Hamburg.

Copper, bars, 102

8,430

Mf. iron, pkgs., 453

2,062

Ag. imp., pkgs., 95

5,613

Ptms., gals., 246,665

26,700

Bells, cs., 5

401

Mach'y, pkgs., 39

2,375

Pumps, pkgs., 7

315

Sew. ma., cs., 925

13,691

Hdw., pkgs., 83

1,357

Copenhagen.

Hdw., cs., 31

685

Mf. iron, pkgs., 6

501

Ag. imp., pkgs., 2

101

Aarhus.

Ptms., gals., 23,844

9,963

Amsterdam.

Sew. ma., cs., 310

tons, for instance, shows that the loss of trade is largely in foreign iron, the percentage of loss in domestic consumption being less than 2 1/2 %. Another feature is that, while the increase in stocks during the last two months of the year amounts to 50,000 tons, business since the first of January is believed to have absorbed at least that quantity in addition to current production. Another strong point is that there are so few furnaces in blast that the danger of overproduction has been entirely removed, so that under ordinary conditions prices are undoubtedly on a solid-rock foundation. There is another important point for consideration, however, and that is consumption. It is tolerably clear that the supply has been adjusted to a comparatively moderate demand, and while it is hoped that consumption can be maintained (and as a matter of fact there is no special reason for thinking otherwise), there are points of uncertainty which cannot be ignored. The Finished-Iron trade, for instance, is in a very unsatisfactory condition, both as to price and demand, and without some improvement in this direction the Pig-Iron market is not likely to be very buoyant. Pipe foundries are very busy, and the impetus given to the market from this source has been of inestimable value. The general foundry business is slack, and, in fact, a large proportion of consumers are working from hand to mouth, hoping for better things toward spring, but have nothing very definite to base their expectations upon. This uncertainty is felt in every branch of business, and in endeavoring to define the character and prospects of the Pig-Iron trade it would be unfair to omit reference to it.

Sales during the week have been at prices within the range last quoted. Business has been satisfactory in amount, and on small lots prices are possibly a shade higher, the entire market being steady, with a tendency toward increasing firmness. No. 1 Foundry has sold at \$20 @ \$21.50, delivered at tide; No. 2 at \$19 @ \$19.50, and Mill Irons at \$17 @ \$17.50 at furnace for ordinary brands, up to \$19 for a few special brands. Good brands of Southern Iron are still available to a limited extent at about \$18 delivered, but some are inclined to ask a trifle more money.

Foreign Iron.—Bessemer Pig has been inquired for, and bids of \$19.50 made for 5000-ton lots, for shipment to New York. Sellers have been quoting \$20 as an inside rate, but are endeavoring to meet buyers about half way, and it is not unlikely that business will be done on that basis. There are buyers of Spiegeleisen at about \$28 for 20 %, but sellers appear unwilling to quote in the present condition of the market, although about \$29 is named for limited quantities.

Muck Bars.—Demand very light, but prices are steady at from \$32 to \$32.50 at mill, according to location, quantity and quality.

Blooms.—Dull and unchanged at about the figures recently quoted, viz.: Charcoal Blooms, \$55 @ \$57; Run-out Anthracite, \$45 @ \$47.50; Scrap Blooms, \$42 @ \$43; Northern Ore Blooms, \$39.50 @ \$41.50.

Bar Iron.—The demand shows no improvement, and business still remains in a very unsatisfactory condition. One way or another there is a good deal doing, but the lots are small and give no assurance of employment beyond that of a day-to-day character. There seems to be no inquiry whatever for large lots, although many leading consumers are still running their establishments pretty well up to their full capacity. Others are doing very little, however, and, as there is great unwillingness to carry stocks, the demand is naturally of a spasmodic and unsatisfactory character. Prices remain at 2¢ for the majority of business, but there are some willing to sell at 1.95¢, and even 1.9¢, when the order is of good size and of a desirable class.

Plate and Tank Iron.—Prices are still low and unsatisfactory, but the mills have taken in a considerable amount of work within the past two weeks, and it is thought that the market is on the eve of an improvement. Two or three orders have been placed, amounting in the aggregate to about 1500 tons, while the demand for small lots has been quite active. On the whole, therefore, manufacturers consider themselves in a better position than they have been for some time, although they may have some difficulty in restoring quotations, concessions having been granted in nearly all transactions since the beginning of the year. Quotations are about as follows: Boat Plate, 2.25¢; Tank Iron, 2.3¢ @ 2.35¢; Shell, 2.75¢ @ 2.85¢; Flange, 3.75¢ @ 3.85¢; Fire-Box, about 4.75¢.

Structural Iron.—Business is quiet, and there is no change to report either as to price or demand. A few small orders have been taken during the week, but nothing to call for special notice. New business is mentioned as probable in the near future, but there is nothing definite at present. Prices are as last quoted, viz.: Angles quoted 2.2¢ @ 2.25¢; Bridge Plates, 2.25¢ @ 2.3¢; T's, 2.75¢; Beams and Channels, 3.5¢.

Sheet Iron.—There is an improved feeling, under a somewhat better demand, and manufacturers are beginning to feel hopeful as to the spring trade. A few good-sized orders have been closed on special rates, but for small lots quotations are as before, namely:

Best Refined, No. 25	44¢
Best Refined, Nos. 20 and 22	44¢
Best Refined, Nos. 18 to 25	35¢
Best Refined, Nos. 12 to 20	34¢
Common, 1/2 less than the above	
Best Bloom Sheets, Nos. 25 to 28	64¢
Best Bloom Sheets, Nos. 22 to 25	62¢
Best Bloom Sheets, Nos. 16 to 21	54¢
Common Red Plates, 3-16 to 16	2.6¢
Blue Annealed	2.7¢
Best Bloom, Galvanized, discount	50¢
Second quality, discount	35¢
Common	60¢

Wrought Iron Pipe.—The usual January dullness in the Pipe trade seems to be intensified this year. There is scarcely any demand at all, and the inquiries which followed the issue of the new list have ceased also. Manufacturers are making up stock for the coming season, and take the present quietness as a matter of course. Prices are firm, with discounts about as reported last week, viz.: Butt-Welded Black Pipe, 25 @

30 % discount; Butt-Welded Galvanized, 15 @ 20 %; Lap-Welded, 45 @ 50 %; Galvanized, 25 @ 30 %; Boiler Tubes, 47 1/2 %.

Steel Rails.—There is no special change to note, the market being quiet and steady at about last week's quotations. The mills are now all comfortably well supplied with orders, and, while there are a good many vacant spaces to be filled in, there is reason to expect that the current demand will be sufficient to tide them over. Inquiries continue somewhat numerous, but the amount of orders given out is not important, being chiefly in lots from 100 to 200 or 300 tons each. Prices are steady at \$35 at mill, with moderate concessions to buyers of large lots when deliveries are favorable to sellers.

Old Rails.—The market is very irregular, but holders are asking higher prices. Small lots are held at prices varying from \$23 to \$23.50, with buyers at about \$22.75. Sales in lots of 50 to 100 tons each at full quotations.

Scrap Iron.—There is not much demand, but with light offerings prices are firm, with sales at about \$24 for No. 1 Wrought and \$16.50 for Cast.

Nails.—The demand for Nails still continues fair, but manufacturers do not seem anxious to press sales at present prices. Stocks generally are small, and it is thought that any increase in consumption would develop a scarcity of Nails. Prices are a trifle irregular at about the same figures as quoted last, viz., \$2.55 @ \$2.65, according to size of order.

PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, Pittsburgh, Pa., Jan. 23, 1884.

The most important feature to note in connection with the Iron situation is an increased movement in the raw article, which indicates that there has been either an improvement in the products or that improvement is expected.

In regard to railroad construction, the indications are favorable. Owing to the extreme cold weather and heavy snow, but little has been done since the early part of December, but as soon as the weather is at all favorable work will be started up. The indications are that there will be as much railroad building this year as last; hence the outlook for Rails and all kinds of railroad supplies is good.

Ores.—The Lake Ore trade continues in an exceedingly unsatisfactory condition, with but little prospect of any immediate improvement. For a number of years past it has been customary with furnaces, not only here, but in the Shenango and Mahoning valleys, to contract for large quantities of these Lake Ores in January for a six months' supply; now these furnaces are buying as their immediate necessities require, those out of blast buying none at all, so that the Ore companies are anything but happy.

Pig Iron.—There has been a material improvement in the volume of business the past week, and, while prices remain unchanged, a stronger and more cheerful feeling has been developed on the part of furnacemen, who are not only convinced that the market has touched hard pan, but are hopeful of an early advance. Stocks in the hands of consumers are unusually light for the season, and will soon have to be replenished. While the trade do not look for any material advance, they expect an increased demand, and are hopeful of being able to put up prices from 50¢ to \$1 per ton within the next few weeks. The improvement reported Eastward has not been without its effect here; it begins to look as if the worst was over and better times for furnacemen were near at hand. Sales have been made within the week under review at \$18.50 @ \$19, 4 months, for All-Ore Forge; \$17.50 @ \$18, 4 months, for Neutral Mill (Lake Ore), and \$17, cash; \$17.25 @ \$17.50, 4 months, for Native-Ore Mill, and \$16.75 @ \$17, cash. Foundry Irons continue dull; quotable at \$18.50 @ \$20, 4 months, according to quality and brand. Bessemer Iron, \$21 @ \$21.50, 4 months, in a small way; a round lot could probably be bought at \$20.50, 4 months. Sales of 200 tons of No. 1 Cold-Blast Charcoal at \$28.50, 4 months.

Muck Bar.—There have been no sales reported for several months; hence it is difficult to give quotations; offered recently at \$32, cash, and might be bought for less.

Manufactured Iron.—The improvement continues slow, but sure. It is very evident, in view of the increased sales of the raw article, that there is more doing in the products, as manufacturers are very conservative and are in no mood to take any chances. With a very few exceptions the mills are in operation, some few of them working pretty full, and the indications are that there will be at least an average spring trade. Prices are still quoted on a basis of 1.75¢ @ 1.85¢ for Bars, 60 days, 2 % off for cash.

Nails.—The general position of the nail market remains unchanged; trade continues quiet, but the outlook for a good spring trade never was better. Prices remain unchanged at \$2.40, 60 days, 2 % off for cash, for carload lots, and 5¢ @ 10¢ per keg additional in a jobbing way. The six weeks' shut-down which commenced on the 29th of December will expire in a couple of weeks, about which time the spring trade usually opens up.

Wrought Iron Pipe.—The mills here are all in operation working up stock. The demand continues light, and it is not expected that orders will be very plenty before March. However, it will take some weeks for manufacturers to work up stock enough with which to supply the warehouses and agents, and by that time large jobbers and consumers will be on the market. No change in prices. Discount in Butt-Weld Black Pipe, 30 %; on Galvanized, 20 %; on Lap-Weld, 50 % on Black and 35 % on Galvanized.

Old Rails.—There is considerable inquiry, but buyers and sellers are unable to get together; hence, but few sales. Consumers quote at \$23, while brokers say that for near-by delivery there are very few sellers under \$23.50 @ \$24.

Steel Rails.—An effort was made here a couple of weeks ago to put the price up

to \$36.50, cash, at works, but it did not work, as they could be bought for less elsewhere; hence, we now quote at \$35 @ \$35.50. The Rail department of the Pittsburgh Bessemer Works will be started up shortly.

Railway Track Supplies.—The demand continues light, but an improvement is expected within the next few weeks. Railway Spikes, 2 1/2¢, 30 days; Splice Bars, 1.75¢ @ 1.8¢; Track Bolts, 2 1/4¢ @ 3¢.

Steel.—The Merchant Steel trade continues light, but manufacturers are hopeful of an early change for the better. Prices unchanged; best brands of Refined Cast Steel, 10¢ @ 11¢; do. Crucible Machinery, 5 1/2¢ @ 6¢; do. Open-Hearth and Bessemer do., 4 1/2¢ @ 5¢.

Crop Ends.—We hear of a recent sale of American at \$23, which may be regarded as the ruling price.

Scrap.—Some dealers report an improvement in the demand, but all agree that prices remain unchanged. Wrought, \$26 @ \$27 per net ton for No. 1, and 50¢ @ \$1 per ton additional for Selected; Wrought Turnings, \$16 @ \$18; Old Car Axles, \$30 @ \$31; Cast Borings, \$13 @ \$14, gross; Old Car Wheels, \$18 @ \$18.50, gross. A dealer bought a lot from the Pittsburgh and Western Railway Company recently at \$17.

Coke.—Is still quoted at \$1 per ton at ovens for blast-furnace Coke. Efforts are still being made by the syndicate to buy out all the small operators, and it will probably be successful in the end.

Window Glass.—The strike still continues, and manufacturers are supplying their customers as best they can with Eastern and foreign glass.

CHICAGO.

Office of The Iron Age, 36 and 38 Clark St., Chicago, Ill., Jan. 28, 1884.

Hardware.—There is no change in the Hardware trade for the past week. The movement of goods is perhaps a trifle less strong, though not felt in a general way. In Carriage and Wagon Materials, Railroad Supplies, Blacksmiths' and Carpenters' Tools the demand is improving slowly, but Cutlery, Stove Wares and Builders' Hardware have been called for in smaller quantities, and there is a noticeable falling off in orders. Upon the whole the market is in a fair condition, and the volume of business thus far is something larger than for the same time last year, but hardly up to the standard set by many of the jobbers several weeks ago.

Nails.—The demand for Nails has dwindled to the smallest kind of a retail trade. Carload lots are not wanted to any extent, and when asked for, the purchaser is advised by manufacturers to hold off, wishing rather to husband their stock—which is light—for the small trade, than to sell in large lots at prices less profitable. For such orders as are being taken for retail consumption \$2.55 @ \$2.60 seems to be the price—the first said to be bottom figures. The market has a firm appearance, but in the absence of demand it is questionable whether it can be so regarded.

American Pig Iron.—The past week seems to have been an off week in the Pig Iron market. The feeling that an advance in price was imminent, which prevailed several weeks ago, and which at the time made sellers less anxious, is losing much of its weight as time goes on and the advance is not made. Many of the consumers who then began inquiring for futures are yet in the market, and show less inclination to buy to-day than they did a fortnight ago. Waiting has been so profitable to the buyer that it requires more than an ordinary effort to bring him to feel that he cannot get better figures by continuing in the same course. For small lots and present delivery prices as quoted are firm and accepted by the buyer without argument. On lots for delivery through the summer contracts cannot be placed at quotations for Charcoal or Coke Irons. Other brands are also firm, and no disposition to cut rates is shown. For carload lots we quote as follows, 4 months: Lake Superior Charcoal, Nos. 1, 2 and 3, at \$22.50 @ \$23; Nos. 4, 5 and 6 at \$24; Lake Superior Coke at \$21 @ \$22; Lake Superior and Ohio, mixed, at \$21; Ohio Standard Black Band, No. 1, \$22 @ \$23; Southern, No. 1, at \$20.50, and No. 2 at \$19.50; Silvery Soft at \$19.50 @ \$21; Anthracite, No. 1, at \$22, and No. 2 at \$21.

Scotch Pig.—While prices for Foreign Iron are firm, there is nothing in the character of the market to induce sales. The change in freight rates, noticed a week ago, had the effect of waking up consumers for a short period, but was not sufficiently alarming to cause them to place orders for anything more than actual consumption required. For Gleggarnock \$28 is quoted, and the same for Summerlee, and no concessions.

Merchant Steel.—The Steel market remains about the same as last week. The demand, which has perceptibly improved during the month, is getting proportionately better as the season advances. The implement manufacturers are taking pretty fair lots, and the orders from tool makers are better than anticipated. The finer grades have the preference and for these prices are in good condition. On the poorer qualities prices are less profitable and the competition very strong. For the Best Refined grades of Steel we make the following quotations:

	Per pound.
Best Refined Cast Tool Steel	10 @ 10 1/2¢
Crucible Cast Machinery Steel	8 1/2 @ 9 1/2¢
Open-Hearth Machinery Steel	8 1/4 @ 9¢
Bessemer Machinery Steel	8 1/4 @ 9¢
Open-Hearth Spring Steel	9 1/2 @ 10¢
Tool-Cut Steel	9 1/2 @ 10¢
Sled-Shoe Steel, flat	23 1/2 @ 24¢
Sled-Shoe Steel, curved	24 @ 24 1/2¢
Bessemer Steel	8 @ 8 1/4¢
Cast Flow Steel	8 @ 8 1/4¢
German Pig Steel	4 1/2 @ 5¢
Syndicate Steel	8 @ 8 1/4¢
Fire-Box and Boiler Steel	5 1/4 @ 6¢

Steel Rails.—There being no demand for Steel Rails the market price has become a question difficult to decide. Roads that are unsupplied are in no hurry to place contracts, for the reason that prices have advanced as far as they are likely to for summer delivery with all the mills now running, while there are idle mills that may start up later on which will be more willing to take contracts and at lower figures than it is possible to place them to-day. The

North Chicago Rolling Mill Company are asking from \$37 to \$40, and claim that they must have these prices to make Rails at a profit at their mill that is not now running, where they must be made if they accept further orders. We hear of \$35 having been offered on a lot of 10,000 tons, but at present writing has not been accepted. There are current rumors that Eastern mills are taking orders to deliver in Chicago at the latter figure, but careful inquiry has failed to verify the report.

Old Rails.—Old Rails are quoted at \$21 @ \$22, Chicago or Milwaukee delivery, with an improvement in the quantity offering and taken.

Bar Iron.—The Bar Iron trade is perhaps a trifle more quiet in a retail way than a week ago. In heavy orders the week has been fully as productive, and the same strength and vitality in this class of trade continues. Quality is the deciding point now rather than price. The experimenting with unknown brands and the shopping for advantageous figures so prevalent two months ago have both passed away for the time, and consumers are placing their orders for the Best Refined Irons where there is no risk. For this quality, \$2 @ \$2.10 is quoted and firmly supported, except when concessions are made for quantity and special sizes. There are Irons being sold as low as \$1.90, but reliable authorities assert that the difference in price is the difference in quality, and has no effect upon the price of the better grades of Bar Iron.

Norway Bars.—The demand for Norway Bars continues fair and prices steady at 4¢ rates. There is considerable competition in the sale of this Iron, and it is possible that there are sales made for less, but if so, there is great caution to keep it from the public.

Builders' Iron.—Nothing in the way of business has developed beyond a few inquiries for several large building projects which are yet in embryo. We continue nominally our former quotations: Tank, 2.7¢; Angles, 2.9¢; Beams, 3.6¢, and Channels, 3.6¢ @ 3.8¢.

Plate and Tank Iron.—The market for this class of Iron is very dull. Trade shows no signs of improvement. We quote Tank at \$2.50 @ \$2.75; Shell, \$3.25 @ \$3.50; Flange, \$4.25 @ \$4.50. Steel Boiler Plate is in better request.

Galvanized Iron.—In a retail way the business in Galvanized is quiet. For special sizes there is a better demand, which helps to make up a tolerably fair trade for the season. Juniata is quoted at 50 % off, and Refined at 50 and 10 % off.

Black Sheets.—There is no improvement in the Black Sheet trade, so far as consumption goes. In the way of price there seems to be less cutting and more attention given to quality. We quote No. 24 at \$3.20, Nos. 25 and 26 at \$3.40, and No. 27 at \$3.60.

Scrap Iron.—There is nothing to report on Scrap Iron. Furnace price continues to be \$18.50 @ \$19.50, Chicago or Milwaukee delivery. The following are quoted as dealers' purchasing prices: No. 1 Wrought Scrap, per net ton, \$16 @ \$17; Cast Scrap, per net ton, \$14; No. 1 Stove Plate Scrap, per net ton, \$9; Wrought Turnings, per ton, \$8; Cast Iron Borings, \$6; Old Plow Steel, \$9; Tool Steel, per ton, \$20; Malleable Scrap, \$5.

Old Car Wheels.—The demand for Old Car Wheels is better than for any other old material at this time. We quote at \$17.50 per net ton for Broken, and \$22.50 per net ton for Whole Wheels.

EVERETT & POST, 156 Lake street, Chicago, report to us as follows, under date of January 26, 1884: **Pig Lead.**—The past week has developed great weakness in Pig Lead, consequent upon unloading of speculators in New York of portion of their stock at 4¢. The Chicago market is quiet and dull; values nominally \$3.70. Consumers, as a rule, are buying only as their actual wants require.

CHATTANOOGA.

Office of The Iron Age, Eighth St., Chattanooga, Jan. 28, 1884.

The tone of general trade is, we think, rather more hopeful. So far there is no sign of slackening production in this section, the indications pointing rather to a considerable increase of output of manufactured articles over 1883. A large stove foundry has gone into operation at Chattanooga during the week, and a blast furnace with a capacity of 120 tons daily will blow in early in February at the same point.

Pig Iron.—There is nothing of interest in the market. The business is still of a hand-to-mouth kind, and, of course, unsatisfactory to producers. We quote No. 1 Foundry, \$18 @ \$19; No. 2 Foundry, \$17 @ \$18; Gray Forge, \$16 @ \$17; White and Mottled, \$14 @ \$15; Car-wheel Metal, \$24 @ \$26.

Ores.—We quote 50 % Brown Hematite, per ton, \$2 @ \$2.75; Red Fossil, \$2 @ \$2.25, delivered at furnace.

Miscellaneous Articles.—Old Rails are worth \$22, with light demand. We quote Wrought Scrap, \$18 @ \$22; Cast Scrap, \$11 @ \$14; Old Wheels, nominal, \$22.

Nails.—We quote Nails at \$2.35 for large bills, 60 days, 2 % off for cash; job lots, 10¢ @ 15¢ higher.

Merchant Iron.—One mill at Chattanooga is on double turn; one on single turn. Bar Iron is dull at \$1.90 for large bills, \$1.95 for small lots. Bolts, \$2.00 @ \$3.10 for Square and Hexagon Heads; Spikes, \$2.30; Splices, \$1.90.

Coal.—We quote Fancy Lump at \$3; Common, \$2.50; run of mine to manufacturers, \$1.50 at mills.

Coke.—We quote at \$2.12 1/2 @ \$2.40 at Furnace. Foundry Coke, \$2 @ 10¢ bushel.

LOUISVILLE.

Geo. H. HULL & Co., Commission Merchants, report to us as follows, under date of January 26, 1884: The market is quiet and very firm in prices. There are many buyers in the market at their own figures—

slightly under market prices—but furnaces are firm and decline all such offers, and sales in consequence are restricted.

FOUNDRY IRON.	
No. 1 Hanging Rock Charcoal	\$28.25 @ \$29.25
No. 1 Southern Charcoal	21.00 @ 22.00
No. 1 Hanging Rock Stonecoal and Coke	20.00 @ 20.50
No. 1 Southern Stonecoal and Coke	19.00 @ 19.50
No. 2 Southern Stonecoal and Coke	18.00 @ 18.50
American Scotch	18.00 @ 19.00
Open Silver Gray	17.50 @ 18.00
Close Silver Gray	16.50 @ 17.00

MILL IRONS.	
No. 1 Charcoal	19.00 @ 20.00
No. 1 Stonecoal and Coke, Neutral	16.50 @ 17.00
No. 2 " " " "	16.00 @ 16.50
No. 1 " " Cold-short	16.00 @ 16.50
No. 2 " " " "	15.50 @ 16.00
White and Mottled, Cold-short and Neutral	14.50 @ 15.00

CAR WHEEL IRONS.	
Hanging Rock, Cold-blast	30.00 @ 31.00
Warm-blast	28.00 @ 29.00
Alabama and Georgia, Warm and Cold-blast	28.00 @ 28.00
Central Kentucky, Cold-blast	26.00 @ 26.00

W. B. BELKNAP & Co., Iron and Steel Merchants, Nos. 115 to 121 West Main street, Louisville, report to us under date of January 26, 1884: **Bar Iron.**—There is not much improvement to report, either in demand or price. There is, however, a firmness on the part of the mills that begets what the trade reports call "hopefulness," and it is by no means an unimportant factor in the situation. When there is general expectancy of better times, they are apt to prove near at hand. The extreme cold weather which has again visited this section, driving the mercury below zero, has effectively checked outdoor work, and consequently diminished mail orders for all heavy goods. **Hoops and Bands.**—There is a rumor that Hoops may possibly be advanced from the present very low figures. A good many large orders have been placed, but, judging from the active competition for a 600-ton order for one firm here (deliveries one carload per week throughout the year), an improvement in price does not appear imminent. One of the conspicuous bidders was the Cleveland Rolling Mill, with Steel Hoops. This, we are told, is but the beginning—that in a few years Steel Hoops will be the rule, not the exception. **Sheet.**—Heavy gauges have certainly reached an ebb figure, and already orders are showing up for spring deliveries on the light, Stovepipe and Pan gauges. **Nails** are jobbing in moderate quantities. The stoppage of the mills was most opportune. Cold weather has prevented anything like free consumption, and had the mills run there must have been a most unwholesome glut of the market. We have yet to hear of any trouble in filling orders. The river here has been closed since January 1, so that lots must now come forward by rail. **Wire** is said by the manufacturers to be "hardening," but the effect is not yet apparent in quotations. It is impossible to use fence wire here at present. **General Hardware** is in better request than usual. Screws are demoralized, but most goods are holding firm. The dissolution of some recently-formed combinations has shaken confidence in all such. The Chain manufacturers have apparently lost faith in the integrity of their agreement, as the association figures certainly do not hold good. The firmly-drawn division between Hoos and Forks, as covered by combination, presents an interesting phase of the general question. Where Weeding Hoes belong is as delicate of determination as where plant life leaves off and animal begins to the naturalist.

ST. LOUIS.

HOPPER & Co., Pig Iron and Iron Ore Merchants, 214 Pine street, report to us as follows, under date of January 26, 1884: Considerable Iron is selling, but at very low prices. The market is not strengthening as fast as hoped. We quote:

HOT BLAST CHARCOAL IRONS.	
Missouri	\$12.50 @ 20.50
Southern	20.00 @ 21.00
Ohio	24.00 @ 25.00

COAL AND COKE IRONS.	
Missouri	12.50 @ 20.50
Southern	18.50 @ 19.50
Ohio	21.00 @ 22.00

MILL IRONS.	
Red-short	18.50 @ 19.50
Neutral	17.00 @ 18.00

CAR WHEEL AND MALLEABLE IRONS.	
Missouri	19.50 @ 21.00
Southern	25.00 @ 26.00
Ohio	28.00 @ 29.00

EVERETT & POST, 421 North Third street, St. Louis, report to us as follows, under date of January 23, 1884: **Pig Lead.**—Since ours of the 16th inst., the market has steadily declined under an entire absence of consumptive demand until yesterday, when the speculators who brought about the advance put out 1500 tons in New York for present and future delivery at 4¢. This rather sudden change of policy may appear as weakness on speculators' part, but it is more probably intended as a lever to buy larger quantities later on at a lower price. At the moment the market offers no suggestion of immediate improvement, and is naturally somewhat unsettled, but, as supplies are concentrated largely in speculative hands, it is not likely that values will be permitted to go much below 4¢. New York, and \$3.70 @ \$3.75, St. Louis. The market here has declined in sympathy with New York, and quotations are entirely nominal at \$3.70 @ \$3.75 for Common and Refined, but manufacturers, expecting a further decline in values, refuse to avail themselves of offerings at above figures.

CINCINNATI.

JANUARY 28, 1884.—**Pig Iron.**—The market during the past week has been very quiet. Inquiries for round lots and late future delivery continue to come from consumers, but have not led to important transactions. Offers from consumers for deliveries through the year have been declined; in fact, it is known that offers on large lots for delivery through the first half of the year have met with no favor on present figures, holders preferring to wait and trust the future for a market for their output. The statistics of stocks on hand and the probable output this year of furnaces in the West and South, together with the probable requirements of consumers who draw supplies from those sources, are well in hand and are thought to be strong arguments against a further de-

cline in prices, and possibly promise some advance in the values of some kinds, if not in all. Quotations:

Best Hanging Rock Charcoal Foundry	22.50 @	22.50
Good	22.50 @	22.50
Southern	20.00 @	21.00
No. 2, 1st less	20.50 @	20.50
Hanging Rock Coke, Best	20.00 @	20.00
Good	19.00 @	20.00
Virginia, Alabama and Tennessee	18.00 @	18.75
No. 2, 50% @ \$1 less	20.00 @	20.50
American Scotch, Best	20.00 @	20.50
No. 2, 1st less	19.50 @	20.00
Silver Gray Softeners, Best	19.00 @	20.00
Good	18.00 @	18.50
No. 2	18.00 @	18.50
Forge, no sales reported		
Car-wheel, Cold-blast	28.50 @	30.50
Maryland, Tennessee and Hanging Rock	24.00 @	27.00
Warm-blast, Alabama and Hanging Rock	24.00 @	27.00
Scrap iron, no sales reported		

BALTIMORE.

W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following, under date of January 25, 1884: The improvement in trade noted in our last continues, and, as the reaction has now set in, it is but fair to suppose that better margins must soon be realized.

Ref. Bar Iron, 1 to 6 x 1/4 to 1, 1/2 @ 21-10¢	21-10¢
" " 1 to 4 1/2 x 1 1/4 to 1, 1/2 @ 21-10¢	21-10¢
" " 1 to 4 1/2 x 1 1/4 to 1, 1/2 @ 21-10¢	21-10¢
" " 1 to 4 1/2 x 1 1/4 to 1, 1/2 @ 21-10¢	21-10¢
" " 1 to 4 1/2 x 1 1/4 to 1, 1/2 @ 21-10¢	21-10¢
" " 1 to 4 1/2 x 1 1/4 to 1, 1/2 @ 21-10¢	21-10¢
" " 1 to 4 1/2 x 1 1/4 to 1, 1/2 @ 21-10¢	21-10¢
" " 1 to 4 1/2 x 1 1/4 to 1, 1/2 @ 21-10¢	21-10¢
" " 1 to 4 1/2 x 1 1/4 to 1, 1/2 @ 21-10¢	21-10¢
" " 1 to 4 1/2 x 1 1/4 to 1, 1/2 @ 21-10¢	21-10¢

R. C. HOFFMAN & Co., Pig and Railroad Iron Merchants, No. 21 South Frederick street, write as follows, under date of January 28, 1884: We have to note a decided increase in the demand for best grades of Wheel Irons at full market rates. Inferior Irons are dull and prices irregular. We quote prices about as follows:

Baltimore Charcoal Wheel Iron (Baltimore Ore)	28.00 @	29.00
Virginia Cold-blast Wheel Iron	28.00 @	29.00
Anthracite, No. 3	20.00 @	21.00
" " No. 2	17.00 @	19.00
" " Mottled and White	15.00 @	17.00
Charcoal C. B. Blooms	50.00 @	55.00
Refined Blooms	40.00 @	45.00

RICHMOND.

ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows, under date of January 29, 1884: The iron market is a little more stirring at present than it was prior to the new year. Prices as follows:

No. 1 Scotch Pig Iron	23.00 @	25.00
No. 1 Anthracite Pig Iron	22.00 @	23.50
No. 2	20.00 @	22.00
No. 3	19.00 @	21.00
No. 1 Virginia Coke Pig Iron	19.00 @	20.00
No. 2	17.00 @	18.00
No. 1 " Mill Pig Iron	16.00 @	17.00
White and Mottled	16.00 @	17.00
Virginia C. B. C. Wheel	20.00 @	22.00
Old Rails	20.00 @	24.00
Wrought Scrap, No. 1	19.00 @	20.00
Machinery Scrap, No. 1	17.50 @	18.00
Old Dom. Nails, 1/2 keg	2.75 @	3.00
Richmond Refined Bar Iron, 1/2 B.	4.00 @	4.50
Horse Shoes (Tredgair)	4.00 @	4.50
Mule	5.00 @	5.50

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From Our Regular Correspondent.)

LONDON, ENG., JAN. 14, 1884.

THE WEEK

has been a very dull one in iron and steel circles, the general tone of the market being about as flat as at any time these six or seven years past. There is, indeed, an uneasy feeling abroad and a sense of unrest which cannot well be described in writing, but is nevertheless a real and potent factor. No body is prepared with a remedy for the ills we suffer, and few are ready to rush to other grievances of which they now know little or nothing. In almost every direction there are complaints of desperately low prices, ruinous competition and an amount of overproduction which virtually makes it impossible for any rise in values to take place. This overproduction is plainly visible in almost every branch of business, yet there are scarcely any departments in which it appears practicable to work out an efficient cure for the disease. In two or three branches, however, something may be done, and it is the most hopeful symptom of the present situation that in those branches attempts are being made, or are about to be made, to effect a restriction of the output. In Scotland a number of furnaces have been damped down in order to await the course of events, while in the Middlesboro' district of Cleveland the ironmasters are discussing the proposed prompt stoppage of 18 or 20 furnaces until the revival of trade. In the latter case such a suspension would mean about 25 per cent. of the number of furnaces (84) now running on the ordinary pig iron of the district, and would reduce the monthly make from about 160,000 tons to something like 120,000 tons. Whether the step will be taken or not is as yet undecided, but I happen to know that several influential furnace owners favor the idea; consequently, I fancy it may be adopted. An attempt will be made to secure the active co-operation of the Scotch smelters, as was the case about a year ago, but I think the Scotch masters will fight shy, and will prefer to "play their own hands" rather than combine with their neighbors over the border. Concurrently there is a project for lowering the make of hematite pig iron, which is largely stocked and is in oversupply. On the West Coast there are now 46 furnaces on hematites; in Cleveland, 33; in Scotland, 8; in Lancashire, 5; and in South Wales or Monmouthshire, 8, making about 100 furnaces on this class of pig iron, with an estimated monthly output of nearly 200,000 tons. Present stocks are over 200,000 tons in the several districts, and are increasing, despite the stoppage of seven furnaces in West Cumberland. With the rail trade as it now stands, it is clear that the make is much outside the wants of the market, so that the proposed limitation of the output must be

hailed as a distinct step in the right direction. Lastly, the conferences, of which I have spoken in my recent letter, between the steel-rail manufacturers have been continued, a further meeting having been held in London. The greatest secrecy is being observed by all concerned, and nothing tangible has been allowed to transpire as to the exact nature of the proposals which are being discussed. It is understood, however, that the notion is to institute an international combination of European rail manufacturers, under which the rate of production shall be reduced by at least 10%, while *minima* are to be arranged in respect of prices, below which orders are not to be accepted. It is rumored, further, that something of the nature of a pool is to be tried, but has not yet been generally accepted, owing to the superior positions occupied by the protected mills of Germany and France. I guarantee the accuracy of none of these statements, owing to the mystery and reserve in which the negotiations are being shrouded, yet I should not be surprised if what I have set forth is very near the mark—just as I should be greatly surprised if the scheme attained practical proportions. For myself I fail to see how our rail men can possibly make such an arrangement with their Continental competitors. On the other hand, now that rail-making is a dead industry in all our inland districts, I think it is quite possible to effect a combination among the whole of the manufacturers of such articles whose mills are in Great Britain.

AMERICAN VERSUS INDIAN WHEAT.

The telegrams from your side during the past few days reporting heavy failures in the corn trade at San Francisco, Chicago and elsewhere, remind me of a singularly able pamphlet just issued with respect to American and Indian wheat. This pamphlet has been compiled and issued in India, but copies have been brought here and are being circulated, with additional facts and arguments, circular letters, &c., in this country. Especially is pressure being brought to bear upon Members of Parliament, chambers of commerce, and other public personages or bodies, in order to induce Parliament to sanction the extension of railways and canals in our vast Indian Empire. According to the pamphleteer, India only needs better means of communication to develop its wheat-growing facilities to such an extent that it could easily supply the whole of our wants in that direction, and compete successfully with your Western growers in furnishing wheat to your cities along the Atlantic seaboard. It is argued, further, that by thus encouraging India we should be creating an enormous market for our own manufactured products, besides showing (in the most telling manner) the American farmer exactly where the protectionist policy pinches him. Now, allowing for the zeal of an earnest writer, I am by no means sure that the picture is highly overdrawn—indeed, some excellent judges here believe that the crisis spoken of above has arisen by reason of your people not having made due allowance for other sources of supply. If India (which already sends us about 9,000,000 quarters annually) be properly developed, there can be no doubt that your dear labor would be wholly unable to compete with the cheap labor of the tropics, and a remarkable revolution would come about in food products. Perhaps the idea is one worthy of greater attention than has hitherto been accorded to the subject with you.

THE IRON MARKET

remains exceedingly quiet in almost all branches of the trade, the now general resumption of work having been attended by no increase of activity in the market as a whole. According to the published reports, merchants' circulars and the general gossip of the trade, matters are everywhere dull, and the outlook is not regarded with any confidence. So far as can be seen, there is no probability of any early improvement, so that the ironmasters have no alternative but to accept the current low prices and do the best they can under the circumstances. We hear that in the United States business does not appear to improve, notwithstanding the considerable limitation of the production, nor do latest advices hold out the hope of any immediate change for the better. On the Continent, also, the trade is dull in almost all directions, and prices are as low as on any former occasion. From the non-producing countries and colonies advices are fairly satisfactory, but there appears to be no likelihood of more than an average demand. On the whole, therefore, the situation may be said to be very much the same as of late, its prominent features being a supply in excess of the demand, and exceptionally low selling values as the outcome of the keenness of competition. In some of the smelting districts the question of reducing the output is being discussed, but no concerted action has been taken as yet. In the meantime a number of furnaces have been stopped or damped down in Scotland, Cleveland, West Cumberland, South Wales and other localities for repairs or alterations, so that for the time being the rate of production may be regarded as being temporarily lowered to the extent of several thousand tons weekly. At Glasgow a considerable amount of business is reported to have been transacted in warrants, but prices have not undergone any noteworthy change, and closed at 43/5 $\frac{1}{2}$ ton. There are now 99 furnaces at work in Scotland, against 103 a year ago, and 105 at the same date of 1882. It is worthy of mention that on the same date of 1879 there were 92 furnaces at work, while warrants were 42/9. A year later the price was 70/6. Scotch makers' brands have not varied during the week. In the Middlesboro' district values are again lower, No. 3 being quoted at 35/6 @ 35/9 $\frac{1}{2}$ ton, with a very limited turnover, albeit the shipments are so far ahead of those of the corresponding period of last year. "A North Country Ironmaster" writes that the price of pig iron is, in the majority of cases, below the cost of production. He also states that the richest deposits of ironstone in Cleveland will be exhausted in from 8 to 12 years, while the best qualities of coking coal are fast following. He believes, however, that low-water mark has been reached as regards pig iron. On the West Coast a number of furnaces have been stopped, but the large reserve

stock effectually prevents any recovery in prices, which are still based on 46/ @ 46/6 $\frac{1}{2}$ ton for mixed lots in usual proportions. In that locality some of the men are on strike against reductions in their wages. Elsewhere all grades of pig iron are easy. In some quarters stocks are growing, but it is believed that the aggregate of the entire country at the end of the year was not more than about 130,000 tons beyond that of the close of 1882. The heavy manufactured-iron departments are quiet, with the exception of the armor-plate shops at Sheffield, which are well supplied with orders. Ship plates are lower in price than for years past, owing to the competition between the different makers and the rivalry of steel plates and angles. These are being obtained from Germany at lower than English rates, while basic-steel plates are only 15/ $\frac{1}{2}$ ton higher than iron, and angles of that material are about the same price as iron. It is roughly estimated that the tonnage of ships to be built during 1884 will be about 750,000, as compared with 1,240,000 tons in 1883, so that the decreased demand for plates, &c., may be about 250,000 tons, or equal to nearly 350,000 tons of pig iron. In fencing-wire there is no change, nor has the demand for galvanized sorts been augmented. The quarterly meetings of the ironmasters this week have been awaited with some interest, but no change has been made in the list prices, and matters generally have not been largely affected thereby. Iron rails are unaltered. For old rails the inquiry is but poor, D. H. being nominally 63/ @ 65/ $\frac{1}{2}$ ton, f.o.b. shipping ports. Heavy wrought scrap iron is called about 52/6 $\frac{1}{2}$ ton, f.o.b. London or exports, old boiler plates being 70/, old wire rope, 80/, and old horse-shoes (packed), 95/ $\frac{1}{2}$ ton. Belgian bars are 55/ @ 55/ 10/ f.o.b. Antwerp, and Swedish hammered bars, 50/ 5/ @ 50/ 10/ c.i.f. London. Freighters are still nominal, pig iron, by ordinary steamer, Glasgow to New York, being 3/6 $\frac{1}{2}$ ton. Steel is again without changes of importance, the trade, as a whole, being very quietly engaged. Steel hoops are quoted 28/ 10/ @ 29/ and bamboo steel, 3/4 and upward, 29/ 7/6 @ 30/ $\frac{1}{2}$ ton; Bessemer blooms, 7 x 7 inches, are nominal at 4/ 5/ 1/2, but are neglected. The Siemens-Martin concerns have a fair amount of work in course of execution. Steel rails are dull and in diminished request. For ordinary sections and weights the nominal quotations run from 4/ 5/ to 4/ 10/ $\frac{1}{2}$ ton, but there are rumors of an order having been taken at 4/ 2/6. This report requires confirmation. Nothing definite has transpired respecting the proposed international combination of rail-makers, to which I have already made more detailed allusion above.

SCOTCH PIG IRON

has been irregular and flat until the close of the week, when speculative buying served to harden values to some extent. There are 99 furnaces at work, against 103 last year at date, while Connal's stores contain 586,784 tons. Shipments are small, and the steel trade of Scotland is disturbed by strikes of workmen against reductions of wages. Writing from Glasgow, January 11, James Watson & Co. said: "In the beginning of this week the market was very flat, as low as 42/6 $\frac{1}{2}$ being accepted, but since then it has rapidly advanced on rumors of a curtailment of the production in Middlesboro', and it closes strong at 43/6 $\frac{1}{2}$ ton. The warrant market opened last Monday at 42/9 $\frac{1}{2}$ ton, touched 42/10, and closed at 42/9 $\frac{1}{2}$ ton. On Tuesday forenoon 42/6 $\frac{1}{2}$ was accepted, rallying in the afternoon to 42/9 $\frac{1}{2}$ ton. On Wednesday it advanced from 42/8 $\frac{1}{2}$ to 43/0 $\frac{1}{2}$, cash, closing at 42/11 $\frac{1}{2}$ ton. Yesterday the price further improved from 42/10 $\frac{1}{2}$ to 43/1 $\frac{1}{2}$ $\frac{1}{2}$ ton, and to-day a large business was done from 43/1 $\frac{1}{2}$ to 43/6 $\frac{1}{2}$, closing with sellers at the latter figure, buyers offering 43/6 $\frac{1}{2}$ ton. The shipments last week were 5190 tons, as compared with 7460 tons for the corresponding week last year." We quote:

	No. 1.	No. 2.
G. M. B., at Glasgow	44/9	42/9
Clyde	47/6	45/6
Coltness	50/6	51/
Langloan	54/	50/6
Gartshore	51/	49/
Summerlee	54/6	45/6
Calder	54/	47/
Carnbroe	51/6	47/6
Glenarnock, at Ardrossan	51/6	45/6
Edinburgh	45/6	43/
Dalmellington	47/9	46/3
Shotts, at Leith	54/6	52/
Kinnell, at Boness	46/6	45/6
Carron, at Granemouth	48/6	47/6

MIDDLESBORO' PIG IRON

is flat and in poor request at 35/6 @ 35/9 $\frac{1}{2}$ ton for No. 3, and G. M. B., f.o.b. at makers' wharves in Tees, net cash, as under:

No. 1	40/	No. 4 foundry	35/
No. 2	38/	No. 4 forge	34/6
No. 3	35/6 @ 35/9		

The rumored intention of restricting the make has to-day slightly improved the tone of the market. Bolckow-Vaughan's men are still out on strike.

WEST COAST HEMATITES

are to-day also a shade steadier, for the reason just advanced, but the demand is poor, and mixed lots sell at 46/ @ 46/6 $\frac{1}{2}$ ton in usual proportions, with makers' brands as follows:

	No. 1.	No. 2.	No. 3.
Cleator	48/	47/6	47/6
Lonsdale	47/6	47/	46/6
Workington	47/6	47/	46/6
Lowther	47/6	47/	46/6
Dunston	47/6	47/	46/6
Harrington	47/6	47/	46/6
Solway	47/6	47/	46/6
Maryport	47/6	47/	46/6

THE QUARTERLY MEETINGS

of last week passed over without producing changes of other than minor importance. At Middlesboro', on January 8, the attendance was limited and the business done small. Sellers were weak in their views and disposed of No. 3 at 35/6, the increase in stocks, the large make and the gloomy outlook being all in favor of buyers and the bears. Angles were called 25/ 2/6 @ 25/ 5/; bars, 25/ 7/6 for common; puddled bars, 23/ 12/6 net, and ship plates 25/ 10/; less 2 1/2 %. On January 11, three days later, William Whitwell & Co., of Stockton, lowered their "crown" bars to 26/ and other sorts *pro rata*. At Wolverhampton, on January 10, there was about an average attendance, but the business transacted was decidedly limited, many negotiations being left in suspense until next day's meeting at Birmingham. On January 10, at Birmingham, there was an

enormous attendance, the Exchange being quite unable to accommodate all who mustered on the occasion. As at Wolverhampton, finished iron underwent no change, marked bars being requested 27/ 10/ by the "list" houses, with the usual 12/6 extra for Lord Dudley's brands, which were, further, 29/ 10/ for single-best bars, 211 B B, and treble-best, 213; rivet and angle bars, 210/ 10/ for B, 212 B B, and 214 B B B. Messrs. Barrows called their best "crown" bars 29/ 10/ but good bars were offered at 26/ 15/ @ 27/ and common at 26/ @ 26/ 5/ 1/2. Hoops were 26/ 7/6 @ 26/ 10/ for export, and gas-tube strip 26/ 2/6 @ 26/ 7/6. Good sheets for working-up purposes were 210/ @ 211/ for singles, galvanizing singles 27/ 5/ 1/2, and doubles 27/ 12/6 @ 27/ 15/ 1/2, and ladders, 29/ $\frac{1}{2}$ ton. Tank plates were 27/ 10/ and upward, and boiler plates 28/ 10/ @ 29/ 10/ 1/2, while angles were 26/ 12/6, and slit nail rods 26/ 5/ $\frac{1}{2}$ ton. Wire rods were very weak, and only a few sales were made of bridge and girder plates.

THE BOARD OF TRADE RETURNS

for December, issued just too late for my last week's letter, are of more than ordinary interest, as giving the figures for the whole of last year as well as for December. Briefly summarized (out of regard for your space) they show the following comparisons:

	Imports.	Exports.
Total value	£425,675,937	£412,001,683
In detail:		
Twelve months.	1882.	1883.
Copper ore, tons	103,393	105,879
Regulus and precipitate, tons	40,297	57,726
Unwrought and part wrought, tons	35,529	35,633
Iron ore, tons	3,281,490	3,178,310
Iron bar, angle, bolt rod, tons	139,652	122,777
Iron manufactures unmanufactured, cwt.	3,450,542	3,385,294
Steel, unwrought, tons	8,845	4,109
Lead, pig or sheet, tons	87,741	101,489
Pyrites of iron, cwt.	666,923	600,721
Quicksilver, lb.	1,444,442	1,088,982
Teeth (elephants), cwt.	9,790	13,282
Tin in blocks, &c., cwt.	48,017	525,715
Zinc (crude), tons	42,001	40,787
Do. manufactured, cwt.	373,691	407,091

The aggregate value of our exports last year was £239,829,743, against £241,467,162 in 1882 and £234,022,678 in 1881. The total quantity of iron and steel exported was 4,044,273 tons, valued at £28,584,253, against 4,353,552 tons, valued at £31,598,306, in 1882, and 3,820,315 tons, worth £27,590,908, in 1881.

TO THE UNITED STATES

our exports were as under—comparing the two Decembers and the whole of the two years:

Article.	Month of December, 1883.	Month of December, 1882.	1882.	1883.
Hardware & cutlery	30,740	32,202	509,317	416,966
Iron—pig	13,529	29,560	488,970	382,924
Bar, angle, rod, &c.	410	1,690	22,448	8,738
Do. unwrought	6,192	7,222	198,275	75,461
Hoops, sheets, plates &c.	780	1,309	37,220	28,805
Tin plates	10,964	15,025	214,538	212,734
Cast or wrought	111	447	6,774	5,008
Old	4,017	10,825	80,528	60,092
Tin unwrought	1,084	4,751	131,281	28,430
Lead, all sorts	2,858	2,848	577	861
Steam engines	968	6,894	94,021	47,185
Old machinery, &c.	36,528	85,856	382,089	458,876
Tin, unwrought, cwt.	866	590	16,191	5,599
Special return—iron rails	100	8	21,134	9,638
Steel rails	5,767	6,784	173,878	60,346

TIN PLATES

are quiet. The quarterly meeting of the association took place at Birmingham on the evening of January 10, Mr. P. W. Flower, of Neath, presiding. There was a good attendance and it was decided "to maintain present prices." Confidence was expressed in the future of trade, in view of the increase in exports to 4,815,000 boxes last year, coupled with a reduction in stocks of 240,000 boxes. Current quotations range from 15/3 to 15/6 for ordinary coke tins, with rather more for choice brands, and coke tin wasters, 14/9 @ 15/—14 x 10's being obtainable at 14/6 @ 14/9 $\frac{1}{2}$ ton. Some brands of charcoal tins are to be had at 17/ @ 17/6 $\frac{1}{2}$ ton. The bears are again rampant and are making exceedingly strenuous efforts to pull down prices to a lower level than that lately obtaining.

Messrs. Henry Rogers, Sons & Co., London, &c., quote:

MF Best Charcoal, IC, f.o.b. $\frac{1}{2}$ cwt.	1 0 6
Talbot Crown Charcoal, IC, f.o.b. $\frac{1}{2}$ cwt.	1 0 6
Talbot Crown Best Coke, IC, f.o.b. $\frac{1}{2}$ cwt.	0 18 6
R.K.P. Coke, IC, f.o.b. $\frac{1}{2}$ cwt.	0 17 6
Tewdrow, IC, f.o.b. $\frac{1}{2}$ cwt.	0 16 6

Discount, 3%.

Messrs. Grey & Marten, London, quote:

Best Charcoal, IC, $\frac{1}{2}$ box	0 19 6
Second Charcoal, IC, $\frac{1}{2}$ box	0 18 6
Best Coke, IC, $\frac{1}{2}$ box	0 17 6
Second Coke, IC, $\frac{1}{2}$ box	0 16 6
Terne Plates, $\frac{1}{2}$ box	0 15 6

In their annual circular, Messrs. Thomas Boyd & Co., Liverpool, say: "The course of this market was unsatisfactory both to manufacturers and merchants, the fluctuations in prices being very nominal, and showing a meager margin of profit at any period. The opening quotations in January were 16/6 for B V grade coke and 19/ for charcoal tin 1 C, but prices gave way gradually until, in April, coke primes changed hands at 15/6, and charcoals at 17/9. In June and July there was a little improvement, when 16/3 to 16/6 was paid for cokes, but by the end of August this improvement was lost, and 15/9 to 16/ was accepted for cokes and 17/9 for charcoal and steel plates. In the commencement of October there was a short rally, and at the quarterly meeting, held in Birmingham, 16/4 $\frac{1}{2}$ was paid for cokes and 16/6 was asked. This rise in value has, however, since been lost, and the year closed with good cokes offering at 15/9 and steel plates at 17/6 @ 18/. One remarkable feature of the tin-plate trade during the past year was the high price of waster cokes as compared with primes, the former having been sold at 15/7 $\frac{1}{2}$ when the latter could only command 16/3, the closing price of coke wasters being 15/3 for 14 x 20 and

15/ for 14 x 10. We annex, as usual, a list of various brands, with the prices at present ruling."

These quotations are:
Tin and Terne Plates, &c.

Charcoal Tin Plates—14 to 16 x Specification	s. d.
Lincoln	18 6
Pennywydd	18 6

CLASSIFICATION OF TIN PLATE.

In the form of a handsome card suitable for tacking up in the office, Messrs. Charles S. Trench & Co., metal brokers, 284 Pearl street, New York City, have issued a graded and alphabetically arranged classification of tin plates. Four general classes of tin plates are recognized—namely, charcoal tin plates, coke tin plates, charcoal ternes and coke ternes. Referring to charcoal tin plates, five general grades are recognized: First, extra quality; second, Melyn grade; third, Calland grade; fourth, Allaway grade, and, fifth, steel plates, coke finish. The Allaway grade is subdivided into prime steel plates, old

brands and ordinary. In several of these grades subdivisions are recognized. Those plates most nearly approaching the standard are placed first; then, after a vertical dash in the column, others are given which do not quite come up to standard in the estimation of Messrs. Trench & Co., and so on, thus indicating their ideas of the actual quality of the plates named. As being of interest to our readers, we publish the classification in full herewith, remarking that it is one of the most important additions to the literature of tin plates that has been recently made. Those of our readers who have the good fortune to have the large card which we have mentioned above, will probably find it

serviceable if tacked up near desks in their shops where it can be referred to when plates are quoted by brands, or when traveling salesmen are soliciting orders for plates of certain grades. It must be borne in mind that the classification given is only that of a prominent firm of metal brokers, and that other houses may take exception to some of the conclusions which Messrs. Trench & Co. have reached. It is possible, too, that manufacturers in some instances may claim that injustice has been done their brands, but in the absence of any more definite standard the trade are warranted in attaching great importance to a classification presented by a firm which aims to serve the best interests of its patrons:

the works are running the same as usual. No trouble is feared from this move, and it is probable that the time will be restored to them as soon as business looks up a little.

Moorhead & Co. have resumed work in their puddling department.

OHIO.
The directory of the embarrassed firm of Brown, Bonnell & Co. have replied to the petition of the Cleveland stockholders that they file a statement of the present condition of the company, preliminary to dissolving the same. They respond by saying that, owing to the control of the entire affairs of the company by Receiver Brown, for whose receivership, they allege, the petitioners are responsible, they (the respondents) are unable to render an account of the condition of the company, as they have not possession of the books, papers, &c. They claim that, until Receiver Brown is removed and the property restored to their charge, further proceedings must be stayed.

F. & L. Kahn & Co., of Hanging Rock, will probably remove to Hamilton. They have operated their foundry at Hanging Rock for several years.

Mr. H. C. Spaulding, of the Spaulding Iron Company, sends out the following emphatic statement: "A miserable falsehood is going the rounds of the scurrilous papers of this vicinity, reflecting upon the standing of the new Spaulding Nail Works, at Brilliant. There is no trouble among the workmen or between them and the company, although some changes have been made recently for reasons that are satisfactory to both parties. The statement that the men had been asked to leave any portion of their wages with the company is utterly untrue. The mill is doing a nice business and promises to be a steady and good place for workmen, and it may be there is a little spirit of envy at the bottom of the false reports."

OHIO.
Things are reported to be a great deal brighter in Newburg, where the Cleveland Rolling Mill Company are arranging for a busy season's work. Orders are on hand that will keep the rail mill busy for the next year. The Bessemer Steel Works have started up and will be kept going hereafter. The rail mill is being prepared for operation, and the other departments will be opened in February. The Forest City Mill will also start soon.

ILLINOIS.
The City Council have recently passed an ordinance permitting the Union Iron and Steel Company to lay their track on Ashland avenue and to build an elevated railroad on Archer avenue. It is probable that the company will accept the terms of the ordinance, and that operations will be begun at an early day. Some 28 creditors who have accepted the compromise of 50 cents on the dollar have not as yet sent in their claims, and other creditors, representing some \$38,000 or \$40,000, have refused the compromise. It is stated that as soon as the former send in their claims the company will go ahead, regardless of the latter.—Chicago Industrial World.

Graham & Johnson, of Chicago, are at work on three tons of brass castings for electric brakes for one of the street railways of that city. They are also building a number of hydraulic pumps and are busy on their improved bearing metals for extra-heavy shafts in rolling mills. They will take possession of their new works about February 15.

MISSOURI.
The Missouri Wire Fence Company closed down their works on Monday of last week. They have been enjoined by the Washburn & Moen people.—St. Louis Age of Steel.
The St. Louis Malleable Iron Company are working eight large annealing ovens to full capacity, but owing to a crowding of orders they are obliged to have a part of their annealing done at other malleable works. They think, with the addition of two new ovens, which they contemplate building soon, they will be able to catch up with their work in the annealing room.—St. Louis Age of Steel.

METALLURGICAL NOTES.

Improved Method of Casting.
A French patent has been granted covering an improved method of molding or casting railway carriage and truck wheels, and other objects in iron, copper or steel, by means of which the use of the ordinary core boxes is obviated, and a great saving of time effected, as compared with the ordinary methods. In the case of railway carriage and truck wheels the mold is formed by building up on a horizontal plate or frame, first, a portion of the central hub or boss, and a portion of the flange to receive the spokes, which may be cast in it as desired; and, secondly, the other parts, which, when fixed to a sand-box or frame, and rammed with sand, and the parts or some of them forming the metal pattern withdrawn from the mold, present the required shape of wheel mold in sand, the outside of which is chilled by means of a suitably constructed chilling piece. For vertically raising, from the sand-mold, the various metallic parts of which the pattern is composed without shaking or injuring the sand-mold, a special form of lifting appliance is used, consisting of a throstle or yoke-shaped bracket or stand, fitted with a vertically sliding cylinder or bar held in position by a spring.

New Method of Casting Small Ingots.
A patent has recently been granted to a Sheffield inventor for improvements in the means and apparatus for casting ingots specially applicable for circular saws, tire blocks and similar articles. This invention consists in the construction of a mold mounted on and fixed to a shaft rotated by a set of vanes fastened to the shaft, the vanes being formed like the blades of a fan, inserted in a fixed case with inlet and outlet for the steam and being acted on by a jet of steam, by which the spindle and mold are rotated. The mold is in two parts, bolted together so as to be readily removed to release the ingot when cast. The top half of the mold is fitted with a runner box, which is recessed to receive and retain a loose bush

which can readily be replaced. The invention also comprises a rotary mold which can be filled from the bottom, so that the molten steel can rise up in the mold and drive out the air, through an opening in the top, as it ascends, and the steel in the mold be subjected to the pressure of the steel in the runner. The molds can be made so as to cast one or more ingots or blocks for circular saws, tires and other similarly-shaped articles, and are secured together by bolts and springs, so as to expand and contract easily, one segment being made to project or lap over the next one.

Improvement in Welding Compound Plates.

In compound plates as hitherto manufactured from alternate layers of hard and soft steel and iron, the different metals during welding, and afterward while in a highly heated state, allow of a considerable portion of the carbon passing from the hard to the soft layers. The object of manufacturing compound plates is thus to a great extent frustrated, while other difficulties arise in the manufacture, since, according to conditions of temperature, more or less carbon passes into the soft layers, so that in many cases the requirements as to the amount of carbon to be contained in the plates is not obtained. To overcome this difficulty, Mr. F. A. Krupp, of Essen, welds between the hard and soft layers of compound plates a thin layer of such metal or alloy as will prevent, or at least impede, the passing of carbon from the harder to the softer layer. Among such metals and alloys of metals which impede the passing of carbon, and at the same time are readily welded to iron or steel, are nickel, cobalt and highly silicious iron. Krupp uses, by preference, sheets or plates of nickel, welded on both sides to sheets of iron, and attains his object with a comparatively thin layer of nickel. The invention is applicable not only to compound plates, but also to other articles which are composed of hard and soft kinds of steel and iron, and may be applied in various ways. As a rule, however, the conditions of temperature of the layers to be combined with one another must be so chosen that the intermediate layer is well welded with the iron and steel, but not melted. The simplest method of making such a plate is to make the intermediate plate as if it were a partition in a mold or form into which hard steel is poured at one side of the dividing plate, while mild steel or homogeneous iron is poured in at the other side, one metal being cast at a time, after which, the casting having set sufficiently, it is placed in another mold and the other material poured against the reverse side of the intermediate plate.

Influence of Heat on the Molecular Structure of Zinc.

In an article published in a foreign exchange, S. Kalischer says that when rolled zinc is heated to at least 150° C. (302° F.), it loses its clear ring, is easily bent, producing a noise which greatly resembles the "tin cry"—that is to say, it becomes crystalline. If such a plate, that has been heated, be suspended in a solution of copper sulphate, the precipitated copper will show distinctly a crystalline structure. Accompanying this change of molecular structure there is also an increase of density, amounting to .003, that takes place; at the same time the electric conductivity is increased by 3 per cent. After strongly heating copper and iron, evidences of crystallization were clearly seen.

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Table Showing Classification of Tin and Terne Plates, Issued by Charles S. Trench & Co., New York.

CHARCOAL TIN PLATES.										COKE TIN PLATES.									
Extra Quality. (Not graded.)	Melyn Grade.	Calland Grade.	Allaway Grade.			Steel Plates. Coke Finish.	A B Grade.	Yapitty Grade.	J B Grade.	B V Grade.	Lantwit Grade.								
			Prime Steel	Old Brands.	Ordinary.														
Cookley K	E C C	Calland	Alma	Allaway	Abercarne	Alyn	A B	Derwent	Chifrew	Ashford	Horton	B F							
Falcon	Melyn	DE	Burrows	Amman	Alfred	Bedil	A C	Hawkwell	Glyn	Grafton	Iolo	Ebbw							
Hendy	P S & Co		Camaret	Bailey	Arley	Bethos	Alpha					EV							
K C B	Talbot		Deva	Cartharthen	Avondale	Brenin	Arley					Kentledge							
M F			Dunstan	Cwmfelin	Beaufort	Capitol	Beaufort					Lantwit							
Tregoning			D G	Gilbertson	Baglan	Cambrian	Cookley					Swansea							
			Gelert	Heron	Clifton	CO	C O												
			Grassmere	L R B	BSC	Cwmfelin	Cwmfelin												
				Machen	Cwmavon	Don	Gilbertson												
				Monnow	Dell	Elm	Glanmore												
				Neath	Delta	Elba	Hawk												
				Parkend	D R D	Glan	Landore												
				P D	Eagle	Goodwood	Llandilo												
				Raven	E V	Hexam	Nantylglo												
				Trefula	Gwithon	Katherine	Nelson												
				Vaughan	P M	Knox	Newton												
						Gloster	Pen												
						H F	Dowlais												
						Lanmore	E A P												
						Letty	Frood												
						Oban	Flint												
						Penwilt	Rudry												
						Premier	Gelly												
						Strick	Gilwen												
						Parsons Best	Garnant												
						Pentre	Glais												
						Rhos	Glaisyn												
						Ruperra	Grenig												
						Suez	Gurnos												
						Sardis	Giantawo												
						Ucha	Hensol												
						Velindre	Hive												
							Varna												
							Wenault												

INDUSTRIAL ITEMS.

MASSACHUSETTS.

The edge-tool works of A. W. Crossman & Son, at West Warren, will add sufficient machinery to the plant within the next three months to nearly double the production. Nickel-plating works, and probably larger turbines, will also be put in. The concern now make about 1000 kinds and sizes of edge-tools.

The Holt Manufacturing Company—capital, \$15,000—will manufacture hardware and mechanics' tools at Springfield.

An extensive cut in wages has been announced at the factory of the Waltham Watch Company. The existing rates will be reduced from 5 to 50 per cent., and the cut will reduce the pay-roll 10 per cent. Competition is stated to be the cause for this action, and for the recent discharge of some 40 hands the same reason is given.

CONNECTICUT.

The Farrel Foundry and Machine Company, of Ansonia, have undertaken and successfully poured what is probably the largest hollow chilled roll in this country. It is 13 feet long on the face, 17 feet over all, and 30 inches in diameter, requiring about 14 tons of iron to cast it.

NEW YORK.

The molders employed at the Bent Foundry, Port Chester, struck last week upon being notified of a 20 per cent. reduction in their wages. Their places have not yet been filled.

PENNSYLVANIA.

The foundries of the Reading Hardware Company are closed on account of the strike of the molders against the 10 per cent. reduction.

One of the mechanical puddlers in the West Mill of the Phoenix Iron Company, at Phoenixville, exploded on January 25, owing, it is supposed, to a lump of ice or snow getting into the cylinder. General Superintendent Reeves and J. T. Nichols, in charge of the mill, were knocked down, but no one was hurt.

The Wilkesbarre Iron Fence and Screen Manufacturing Company opened work in their screen department on Monday, January 21, and the two branches of industry carried on by the company serve to make the workshop a busy one.

The Pottstown Iron Company intend erecting a universal plate and shape mill of large dimensions as an addition to their present extensive works.

The Newcastle Iron Works, familiarly known as the "Sheet Mill," and until within a short time ago operated by Reis Brothers,

who recently failed, was sold again Friday last on a mortgage of \$12,000 at \$61,000. It is understood that this divests it of all liens and gives a clear title. T. M. Sweeney, acting for the Kimberleys, was the purchaser, and it is said that it will soon be put in operation. The employees have been paid 50 per cent. of the money due them when the firm failed, the total amount due being about \$10,000.

The Greenwood Rolling Mill, at Tamaqua, after six months' idleness on account of financial difficulties, resumed operations last week under the superintendency of John Ralston, the receiver. It will run on muck bar iron, and at first will employ but 50 men. It is expected to increase the force from time to time until the full complement of men is again employed. The idleness of the mill for the past half year has had a very depressing influence in Tamaqua, and its resumption is hailed with much pleasure.

The new nail mill of Reuben Johnson & Co., at Northumberland, has been completed and the furnaces started.

The nail factory of McLanahan, Smith & Co., at Hollidaysburg, which has been idle for about six weeks, resumed operations on January 22. The rolling mill is still idle.

The Parkesburg Iron Works, which have been stopped for repairs, are again in full blast.

Arrangements are being made by the Phoenix Iron Company, at Phoenixville, to roll 9-inch steel deck beams. They have been successful in rolling 6, 7 and 8 inch beams, and will no doubt be equally so with the 9-inch.

A reduction of 12 per cent. in wages at the mill of the Montour Iron and Steel Company, at Danville, has brought the puddlers out. The mill is idle, and the managers evince no great desire to run unless the reduction be accepted.

It is reported that a strike is threatened at the new Danville Nail Works.

Macungie Furnace, owned by the Macungie Iron Company, at Reading, started on January 22, after a month's idleness.

The Hartford Breaker, at Ashley, under lease to the Philadelphia and Reading Coal and Iron Company, has been burned. This fire throws 600 men out of employment. The loss on the breaker is \$100,000.

producers of iron in this country. The plant is a valuable one, and it is to be hoped that under reorganization new life will be infused into the establishment and work given to a large force of men.

Application is to be made for a charter by a corporation, to be known as the Jefferson Coal Company, which will mine coal in Jefferson County. The capital stock will be \$500,000, and the office will be located in Bethlehem. The directors are E. P. Wilbur, G. B. Linderman, and Warren A. Wilbur, of Bethlehem; R. Abbott, of South Bethlehem, and A. C. Yates, of Rochester, N. Y.

The Chickies Iron Company recently presented \$1680 to those of their employees who remained with them the past year, for their good behavior and faithful services, each man receiving a certain percentage on the amount he earned.

The Plymouth Rolling Mill Company have contracted to furnish the Philadelphia and Reading Railroad with 50,000 tons of crushed cinder, and are about to erect a very large crusher at their furnaces in Conshohocken to prepare the cinder for delivery. The crusher will probably give employment to 20 additional hands.

PITTSBURGH AND VICINITY.

The old firm of Kirkpatrick & Co. has been dissolved and the business continued under the name of Kirkpatrick & Co., Limited. Mr. Barker C. Willson, long connected with the firm, now appears as treasurer of the new corporation.

The Republic Iron Company, Limited, have started up their mill double turn.

The Homestead Steel Works will start up in all departments as soon as the repairs which are now in progress are completed.

Natural gas has already taken the place of coal at the mill of Dilworth, Potter & Co., and at the glass works of Doyle & Co., Macbeth & Co. and Adams & Co. A saving of 10 per cent. is claimed to be effected in this method of heating. There is some talk of putting down test wells in the Twenty-seventh and Thirtieth wards, as it is thought a vein exists there.

The statement that Jones & Laughlins, Limited, are increasing the number of puddling furnaces in their works is pronounced by the firm to be untrue.

The Oliver & Roberts Wire Company are building a rolling mill, in addition to their wire works, for the manufacture of wire rods. The new building will be completed in about two months, and will be the only rod mill in the city.

The reduction of time of the night-turn men at the McKeesport National Tube Works has been quietly accepted by the men, and

(For Wholesale Metal Prices, See Page 25.

	Lemon Squenzers.	
	Porcelain Lined.....	W dot \$3.00, dis 35
20	Wood.....	dot 1.00, dis 35
20	Bambs.....	dot 1.00, dis 35
20	Dunlop's Improved.....	W dot 2.50, dis 35
20	Bambs.....	No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800,

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Peerless, with Cog, No. 24.....	\$5.00
Peerless, with Cog, No. 1.....	\$4.00
Peerless, with Cog, No. 3.....	\$4.00
Peerless, with Cog, No. 4.....	\$6.00
Eureka, No. 2.....	\$2.00
Novelty No. 2, for Common Tube.....	\$2.00
Excelsior No. 3, for Stationary Tube.....	\$4.00
Excelsior No. 4, for Stationary Tube.....	\$5.00
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And Index to Advertisements.

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Axles, Springs, &c., Manufacturers of. Cook R. & Sons, Winsted, Conn. 13	Electrotyping and Engraving. Dean Chas. W., Cleveland, O. 31	Horse Hauls, Makers of. Essex Horse Nail Co., Troy, N. Y. 9	Nail Mills. Mills, 71 Chambers, N. Y. 46	Steel Figures and Alphabets. Bellows R. F., Cleveland, O. 4
Barb Wire and Fence. Hawley Bros. Barb Wire Co., Burlington, Iowa, 31	Elevators, Makers of. Clem & Morse, Philadelphia, Pa. 3	Horse Hauls, Makers of. Essex Horse Nail Co., Troy, N. Y. 9	Nail Mills. Mills, 71 Chambers, N. Y. 46	Steel Importers. Abbott & Co., New York and Boston. 50
Barb Wire Machinery. Slover Mfg. Co., Chicago, Ill. 34	Engines, Locomotive. Baldwin Locomotive Works, Philadelphia, Pa. 6	Horse Hauls, Makers of. Essex Horse Nail Co., Troy, N. Y. 9	Nail Mills. Mills, 71 Chambers, N. Y. 46	Steel Importers. Abbott & Co., New York and Boston. 50
Bellevue, Manufacturers of. Bellevue, 111 Cleveland, O. 8	Engines, Makers of. Clem & Morse, Philadelphia, Pa. 3	Horse Hauls, Makers of. Essex Horse Nail Co., Troy, N. Y. 9	Nail Mills. Mills, 71 Chambers, N. Y. 46	Steel Importers. Abbott & Co., New York and Boston. 50
Bells (Hollow). Bevin Bros. Mfg. Co., Easthampton, Conn. 15	Engines, Makers of. Clem & Morse, Philadelphia, Pa. 3	Horse Hauls, Makers of. Essex Horse Nail Co., Troy, N. Y. 9	Nail Mills. Mills, 71 Chambers, N. Y. 46	Steel Importers. Abbott & Co., New York and Boston. 50
Belting, Makers of. Alexander Bros., 412 N. 3d, Philadelphia, Pa. 25	Engines, Makers of. Clem & Morse, Philadelphia, Pa. 3	Horse Hauls, Makers of. Essex Horse Nail Co., Troy, N. Y. 9	Nail Mills. Mills, 71 Chambers, N. Y. 46	Steel Importers. Abbott & Co., New York and Boston. 50
Belting, Makers of. Alexander Bros., 412 N. 3d, Philadelphia, Pa. 25	Engines, Makers of. Clem & Morse, Philadelphia, Pa. 3	Horse Hauls, Makers of. Essex Horse Nail Co., Troy, N. Y. 9	Nail Mills. Mills, 71 Chambers, N. Y. 46	Steel Importers. Abbott & Co., New York and Boston. 50

The Smith Band-Saw Setting and Filing Machine.

Our annexed engraving represents a general view of the Smith band-saw setting and filing machine, which embodies some new and interesting features. The machine employs the ordinary three-cornered file, and does away with the necessity of purchasing special files of some particular design. The setting attachment is perhaps the most novel feature. The setting is accomplished by means of hammers on anvils having the desired angle. By this means the teeth will stay at that angle, and do not spring back, as is often the case with teeth set by a cam motion. The amount of set required can be adjusted to the greatest nicety. The machine, constructed to work by hand or power, has been designed with the purpose of imitating, as near as possible, the movements made in filing and setting band saws by hand, but at the same time to overcome the irregularity of the same, as shown by the high and low teeth in a blade after being hand-filed.

A three-cornered file from 3 to 6 inches long can be used. Being arranged to work about 60 strokes per minute, it will set and file accurately an ordinary 21-foot band-saw in 20 minutes, while an expert workman would occupy 2½ hours to do the same

the main streets having been illuminated by electric lights, the current being furnished through wires in underground conduits. The lamps were put up by the Underground Electric Light and Power Company, who for some time past have carried on operations in Philadelphia, and the experiments just concluded by them have yielded highly satisfactory results, both as regards quality of light and efficiency of working.

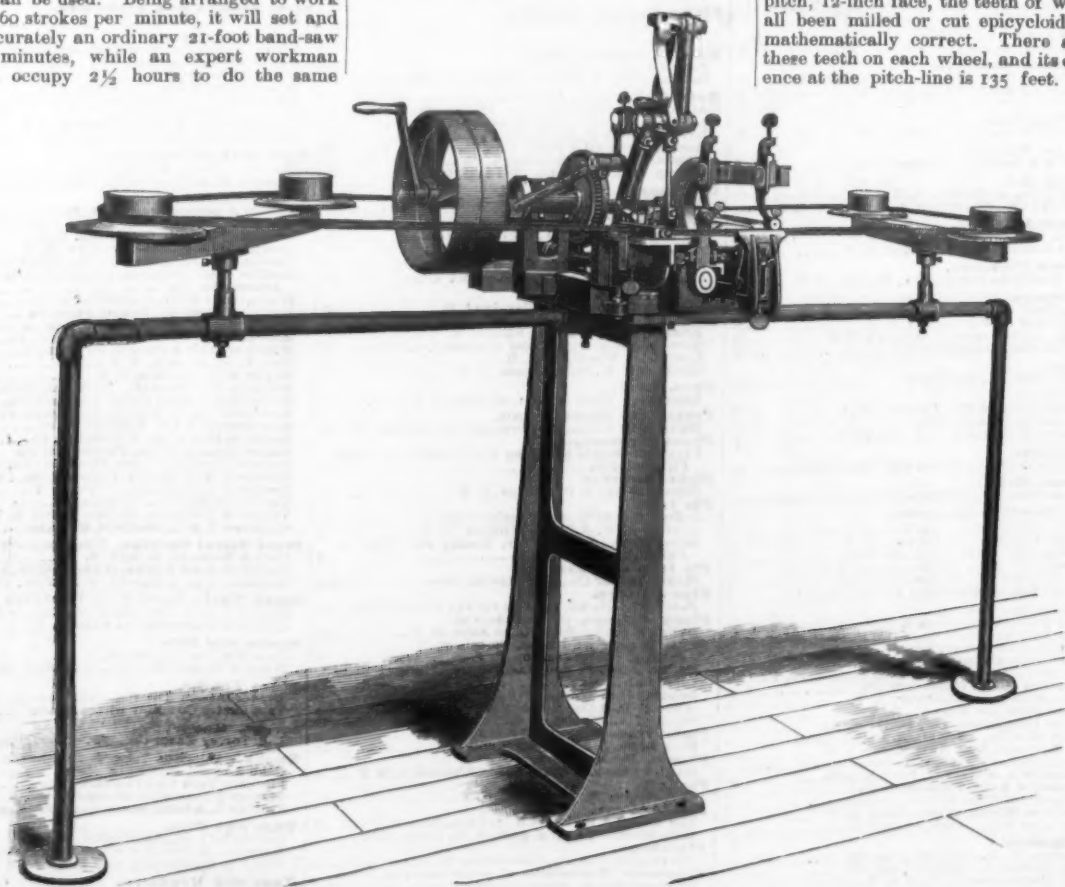
British Trade Prospects.

The founder of the well-known firm of John Brown & Co., Limited, of Sheffield, but who is not an active partner in any commercial industry, recently addressed a Sheffield audience on the state of trade, the report of which we take from an English exchange. He deplored the spirit of restlessness among artisans—a restlessness which might be termed unreasonable expectation. Wages, he said, could only be good when trade was good, and when manufacturers were able to pay high wages they were ready and willing to do so. His forecast of

Hermann Steel Works made 66,073,490 kg. (about 66,000 tons) of steel, against 60,277,000 gk. (about 60,000 tons) in the previous 12 months.

A Large Gear-Wheel.

A correspondent, writing from Scranton, Pa., under date of January 22, says: There is now standing in the main machine shop of the Dickson Manufacturing Company, this city, one of the largest wheels in the world, and the second of the kind ever made, the first having been already shipped for service to the copper mines of the Calumet and Hecla Mining Company, on the borders of Lake Michigan. The combined weight of both wheels is 124 tons, and their cost in place will not be less than \$50,000. The titanic wheel, which occupies a position in the center of the lofty and admirably equipped machine shop, is a marvel of mechanical ingenuity, strength and skill, and has been made from original designs furnished by E. D. Leavitt, Jr., of Cambridgeport, Mass. The spur-gear in the center is 43 feet in diameter at the pitch-line, 4¾-inch pitch, 12-inch face, the teeth of which have all been milled or cut epicycloid, and are mathematically correct. There are 352 of these teeth on each wheel, and its circumference at the pitch-line is 135 feet. On each



THE SMITH BAND-SAW SETTING AND FILING MACHINE.

amount of work. The head carrying the file has a reciprocating movement. In the forward movement the file is held down and the filing of the tooth takes place; in the return movement the file is lifted from the blade, and at the same time the self-feeding motion pushes forward another tooth in readiness for the return of the file. The feed can be instantaneously adjusted to suit the pitch of any saw, and is arranged to feed one or more teeth at a time. A device for holding the saw while being set or filed, as shown in the cut, is supplied. This machine lately received the medal of superiority in competition with the Amesbury machine at the American Institute, New York. It is manufactured by Messrs. Detrick & Harvey, Baltimore, Md.

Remarkable Work at Scranton.—The *Republican* for January 29 contains the following statement: "In converting steel by the Bessemer steel process, the pressure of blast used generally runs from 14 to 20 pounds per square inch. Few works have engines of capacity and power sufficient to maintain a pressure of over 25 pounds while blowing a heat. On Wednesday last, however, while blowing a heat in their converting works, the Scranton Steel Company maintained with their engines a continuous blast pressure of 50 pounds to the square inch. On Thursday last they went a step further, and performed the feat of blowing a heat in each of their two converters at the same time. The heats weighed 4½ tons each and were blown in 12 minutes. So far as known, both of these feats are without precedent at any Bessemer works elsewhere, and their performance shows the very unusual power of the company's engines."

On the State railways in Sweden there is generally a doctor for every 32 miles of line, and in this way 44 doctors are employed by the Government. The private railways have a similar system. The medical men examine all applicants for employment, and reject those physically disqualified, especially by defects of sight and hearing. They also give their services to all injured by accidents on the line, to regular employees and their families in sickness, to occasional employees while engaged in service, to laborers in the shops who have paid the same contribution as those engaged in working the line, and also to their families. No exception is made in the cases of those who suffer from injury or disease caused by their own fault.

A commendable movement in the way of putting electric wires under ground has at last been made in New York, the Fire Commissioners having recently resolved to run certain lines of the fire-alarm wires through subterranean conduits. Should the experiment prove successful, which will doubtless be the case, it will afford another demonstration of the practicability of underground wires, and ought to compel a speedy burial of all telephone, telegraph and electric-light lines in the city. What can be accomplished in this direction has recently again been shown in Philadelphia, an appreciable length of one of

trade in 1884 would not be very acceptable to the town. Prospects were very gloomy, and he began to fear—though he said it with some reserve—that England had almost, if not altogether, reached the summit of her prosperity. He began to fear that British trade was being nibbled at right and left by their neighbors on the Continent and elsewhere; that they had now as competitors many who used to be customers, and that the English manufacturer must not again look for any material prosperity such as the last 30 or 40 years had displayed. Masters and men must pull together for their mutual benefit, and must do the best they could for each other, so as to conserve the trade that was left to them, and, if possible, to recover that which had gone from them. Unfortunately, he was in a position to know that a great many things that were at one time manufactured in Sheffield almost exclusively had now left the town, and he knew of others that were leaving it. He could mention any number of them. Some had been taken by Germany, some by Austria, some by Prussia, and a large slice by the United States. If these items of trade were taken away the effect upon Great Britain must be disastrous. To remedy such a state of things there were two courses to take, and they went in opposite directions. One was to cheapen manufactures, and the other was to improve their quality. Both these things they must do if they were to hold their own. Much English trade was now being taken away by Germany; and the shipbuilding concern at Hull, of which he was unfortunately the chairman, Newcastle, and other places, had during the last 12 months taken their supplies from Germany at prices varying from 10 to 20 per cent below the prices at which Sheffield could supply the material. That was a very serious question for the people of Sheffield. He had talked the matter over with his late partners, and they were astonished that such things could be. There was the fact that some thousands of tons of steel plates had been sent from Germany to the North of England within the last 12 months, to the exclusion of Sheffield. He thought Sheffield ought to get these orders for steel plates, because the railway carriage from Sheffield to Hull was much below the carriage from Germany to Hull. He hoped the year 1884 would turn out much more bright and successful than he at the present moment feared it would. He hoped he might be wrong; but under any circumstances he wished them seriously to consider what he had said—that trade could only be preserved by the united efforts of masters and men, and not by either one side or the other extorting and extracting from the other more than was their reasonable due.

The report for the year 1882-83 of the Hörde (Westphalia) Mining and Iron Company states that the gross profit amounts to 465,955 marks (\$107,170), as compared with 221,345 marks (\$50,900) for the previous year, nearly all of which is absorbed by the fixed charges, so that no dividend can be paid. The total production of pig iron was 90,481,330 kg (about 90,000 tons), against 82,203,860 kg (about 82,000 tons), and the

side of the spur-gear there are 25 double elevating buckets or pockets inserted, making in all 100 buckets, which are stationary on the inside of the periphery of the wheel, and are capable of scooping up at a single revolution nearly 2000 gallons. The wheel will make four revolutions per minute, lifting 8000 gallons in that space of time, or 480,000 gallons an hour. The office of this wonderful wheel is to remove the refuse from the copper ore. It will be set in solid masonry, with arches through which the launders used for washing the ore will pour their contents, to be taken up by the buckets already referred to and deposited in outlet launders placed at an elevation of 40 feet, which will afford a sufficient impetus to carry the waste into Lake Michigan. The enormous amount of refuse now made in the process of copper mining covers an acre of ground 1 foot thick every 48 hours. This is a great drawback and entails heavy cost on the company. It was to do away with this inconvenience, trouble and expense that Mr. Leavitt designed these massive wheels, one of which will be stationed at the Calumet, the other at the Hecla mine. The shaft upon which the wheel revolves is 30 inches in diameter, and is made of gun iron. It rests in ponderous pillow-blocks having universal bearings. The centers of the wheel are octagonal, and its mighty arms are made of wrought-iron lattice-work. They are pyramidal in shape, and jutting out from a common center present an imposing appearance even in repose. The ends of the arms, which are called the bucket segments, are of cast iron, and the spur segments and buckets are bolted to them. The entire affair is put together with turned bolts driven in reamed holes. The most important feature of the wheel is the manner in which the spur has been constructed. The teeth were milled and cut by an ingenious device suggested by such a herculean task and specially planned and patented by Mr. Sidney Broadbent, the superintendent of the Dickson Works. The mean time occupied in milling and cutting the teeth of one wheel, 352 in number, was 215 hours, and the probability is that with the old mode of milling it would take four times as long. The same process was used in the construction of the Brooklyn Bridge machinery, the company having received both orders at the same time. This big wheel will be driven by a steel spur pinion, the shaft of which is actuated by an engine of 175 horse-power.

An engineer of New Orleans suggests the idea of constructing the framework of large exhibition buildings, which must be demolished after brief use, of wrought-iron steam pipes of standard length, put together with standard fittings in such a manner that they can be taken apart without injury and sold at a small loss when the building is no longer needed.

The Pullman Palace Car Company have concluded a contract with the Mexican Central Railway Company, 1200 miles, and it is expected that on the first day of May the Pullman cars will be in full operation between El Paso and the city of Mexico.

RECENT BOOKS.

Hodgson.—Plaster and Plastering, Mortars and Cements. By Fred. T. Hodgson. 102 pages, 12mo, cloth, 1883, . . . \$1

This book is a complete guide for the plasterer in the preparation and application of all kinds of plaster, stucco, Portland, hydraulic, Rosendale and other cements. The chemistry, qualities and uses of the various kinds of cements and limes are practically set forth, and rules are given for measuring, computing and valuing plaster and stucco work. The author has drawn freely from the best works on the subject, and has embodied in the book a large amount of information valuable to the trade. Under the head of "Miscellaneous Memoranda," a number of practical recipes are given. An illustrated Glossary of Terms used in plastering and plaster decorations adds to the value of the work.

Modern Architectural Designs and Details. 10½ by 14 inches, 80 full-page lith. plates, cloth . . \$10

This work, which was published in parts during 1881, is the latest addition to the designs adapted for use among builders and architects, and is about the only volume which has given attention to the modern features of architecture which have appeared during the past few years. The drawings presented are from prominent architects of New York, Boston and other localities, and all the designs given are original in this work. Queen Anne, Eastlake, Elizabethan and other modernized styles are presented. A number of low-priced cottages, adapted to the requirements of the seaside and summer resorts, are included.

Interiors and Interior Details. With an Introduction, Description of Plates, and Notes on Wood Finish. By William B. Tuthill; 52 plates, 10 by 13½ inches, cloth; 1882. . . . \$7.50

This work presents the principles which underlie successful interior finish and decoration. Some of the most able architects of New York, Boston, Chicago and Providence have contributed to its pages. It contains original designs of halls, staircases, parlors, libraries, dining-rooms, &c. There are also special designs in perspective, elevation and detail for low cost, medium and elaborate; furniture, sideboards, wood mantels, wood ceilings, doors and windows, wainscots, bank, office and store fittings. The suggestions are valuable, not only to architects and designers, but equally so to carpenters, builders and mechanics.

Baldwin.—Steam Heating for Buildings. By Wm. J. Baldwin; 3d edition, with many illus. plates, 234 pages, 12mo, cloth; 1882. . . \$2.50

This book is one of the most practically valuable that has appeared in a long while. It is especially adapted to steam-fitters, and contains directions for piping buildings and setting boilers properly, with descriptions of the most approved forms of apparatus for warming and ventilating private houses and large buildings, and for cooking purposes. There can be no opportunity for bungling work if the mechanic is familiar with Mr. Baldwin's excellent plans and suggestions.

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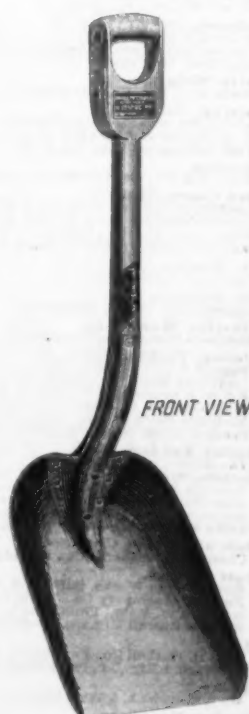
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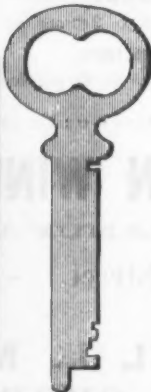
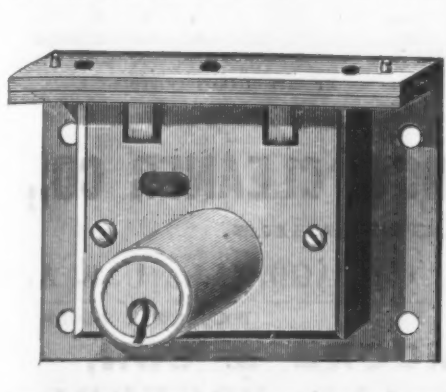
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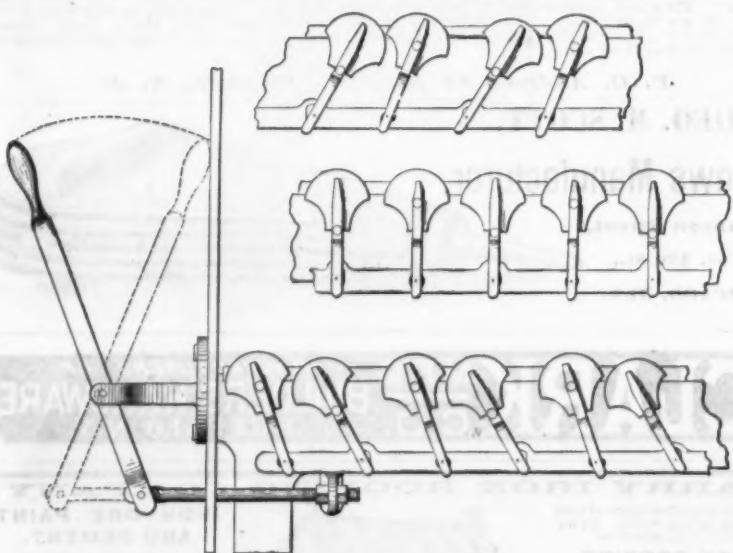
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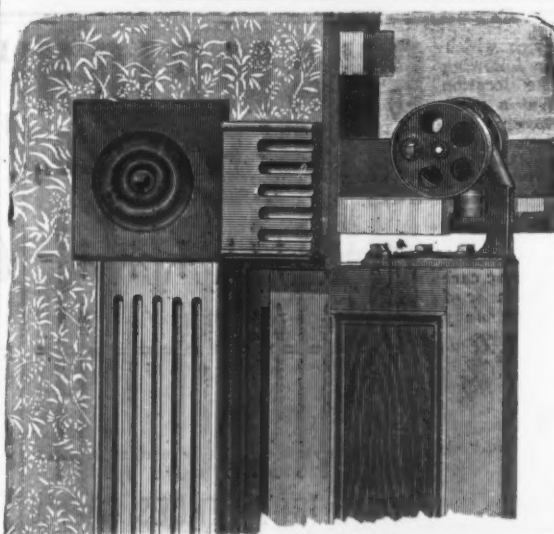
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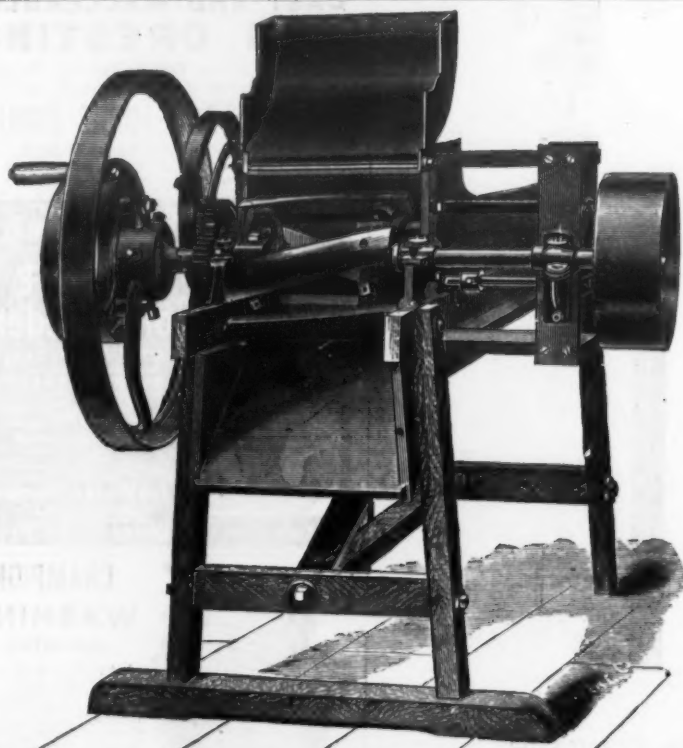
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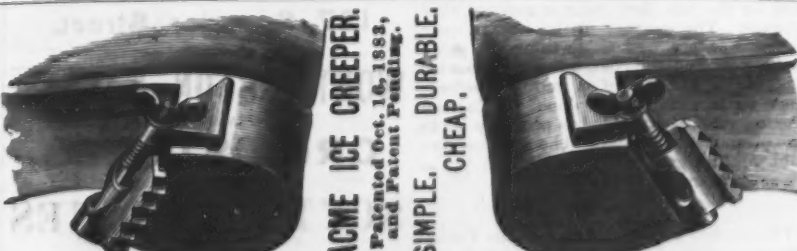
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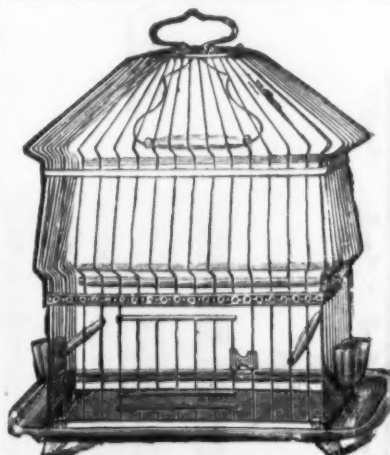
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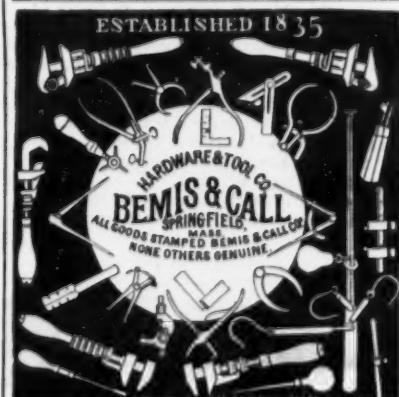
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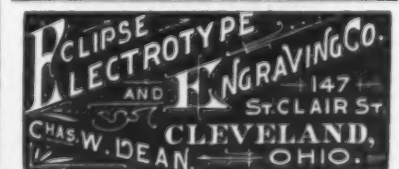
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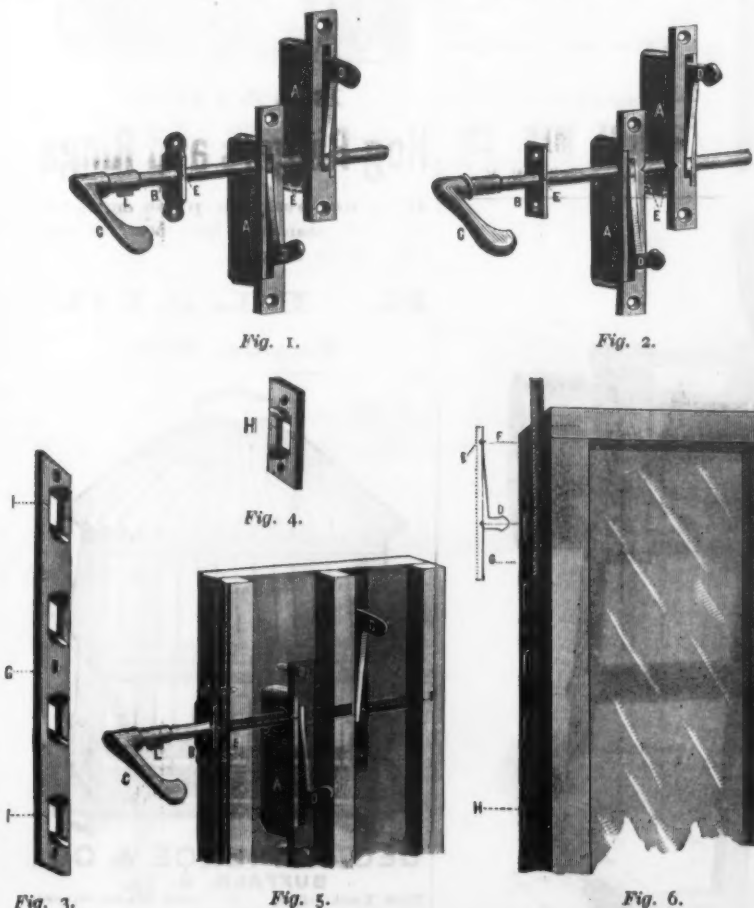
THE HERCULES POWDER COMPANY
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The Attwell Sash Lock and Ventilator.

A new sash lock, quite different in its construction from those in general use with which the trade is familiar, is made by the Attwell Manufacturing Company, 162 Main street, Cincinnati, and is now just being put on the market. It has apparently novel features and advantages as a window fastening, and is called the "Attwell burglar-proof sash lock and ventilator." The accompanying Figs. 1 to 6 will make plain its construction and parts, and the manner of applying it to windows. It is made in two

Among the points in this device which commend it for practical use the following advantages are mentioned: The location of the locks in the window is at a point which renders their operation convenient to users, and, being mortised into the frame, they are not easily deranged, are inaccessible to a thief and difficult to force. These are features themselves well worthy of appreciation; but, aside from this, the lock affords additional security. The bolt being spring projected, the sash is automatically locked, and thus the necessity for the care (which may not be given) and the labor of closing is dispensed with. With the many



THE ATTWELL SASH LOCK AND VENTILATOR.

styles, according as it is to be used in windows which are hung with weights or in those where weights are not used.

Style A, which is illustrated in Fig. 1, is adapted to windows which are without weights, and may be described as follows: A A, two locks (one controlling each sash) working in combination and operated by one key, which is removable at pleasure. B, escutcheon. C, removable key (made of malleable iron). D D, bolts of locks (made of malleable iron) with flanged head, which, in conjunction with "strike," gives a "detent" to bolt when engaged—preventing the accidental falling of sash. E E, center marks on locks and escutcheon given to facilitate the carpenter in his work of applying.

locking points supplied, if ventilation or air be desired in sleeping apartments at night, the sash may be locked at any desired elevation or depression, and by removal of key (if sufficient space be not left for the admission of a thief's body) the result is obtained without any relinquishment of security. Then, too, where windows are without weights, or in case of breaking of sash cords, the operation of this lock serves to hold or control the sash.

Self-Adjusting Wrench.

A new self-adjusting wrench has been brought out by P. Lowentraub, of No. 278 Halsey street, Newark, N. J., and is shown in Figs. 1 and 2. The general appearance of the wrench may be gained from Fig. 1, while the arrangement of the working parts is shown in Fig. 2. It will be seen that the handle is pivoted to one of the jaws, and that its end is formed with cogs in such a manner as to engage with corresponding depressions in the sliding jaw. The effect of this is to cause the two jaws to approach each other and grasp the nut or other object to which they may be applied very tightly whenever the handle is moved for the purpose of turning them. The greater the resistance of the nut against turning, the tighter the wrench grasps it. From this it will be seen that the wrench is self-adjusting. The range of the 12-inch size is from



New Self-Adjusting Wrench.—Fig. 1.—General View.

Style B, illustrated in Fig. 2, is especially adapted to windows where weights are used. In this figure, A A, B, C and E E are the same as in Fig. 1. D D, bolts of locks (made of malleable iron) without flanged heads—so shaped as to avoid the "detent"

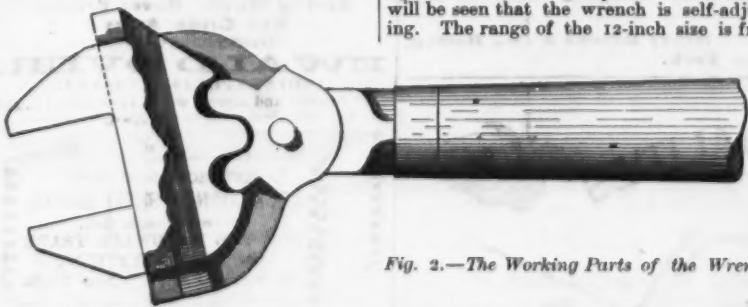


Fig. 2.—The Working Parts of the Wrench.

as employed in style A. L, a pin cast as part of key, which, in conjunction with escutcheon, is used in operating the "shut off" feature of locks style B—i. e., holding bolt of either lock, when desired, out of engagement. G is a continuous metal piece (7 inches in length) giving four "strikes," or locking points, to each sash, to be employed when ventilating, and all within a radius of safety, so as not to permit the window to be opened sufficiently to admit a person. H, Fig. 4, is a single or extra metal "strike," used, when desired, in giving a locking point at increased ventilation to upper sash, and where windows are without weights to hold lower sash at points of greater elevation. For this purpose these extra strikes are supplied for each window.

Fig. 5 gives a sectional view, showing portion of window frame with locks A A inserted in mortises made in pulley stile, immediately to the left of meeting-rails of sash and on the right and left next to parting bead. The escutcheon B is screwed on over hole which has been bored through reveal for admission of key, and the key C is partially inserted.

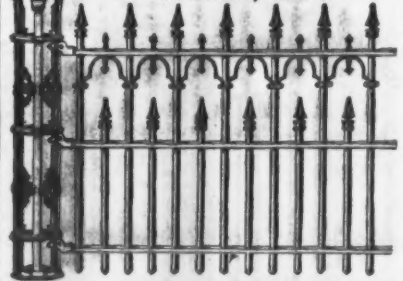
In Fig. 6 is given a section showing a portion of sash, in which are inserted the strike G, and H, when employed, and illustrating their position in relation to the locks.

3/4 inch to 1 3/4 inches. Several sizes of the wrench are made, adapting it to use for almost all purposes that may be required.

A New Haven dispatch says that a movement is on foot among the Eastern ship-owners to compel an increase of the present coasting freight rates. Many of them are refusing cargoes at the present average rate of \$1.50 a ton from Baltimore for coasting transportation, as they say it does not pay them for the risk they take in making winter runs. The weather at this time of year is always severe, and this winter the gales off the New England coast have been heavier than for a quarter of a century before. Much damage has been done to Eastern coasting vessels, and this has probably led to the present movement. The ship-owners want the Eastern rate increased to \$1.75, as it was last summer.

The English papers report that the Parliamentary notices for next session include two to provide tramway connections, by means of the continuous wire-cable system, in certain districts of Edinburgh, where, from the gradients, the introduction of ordinary tramways has been found impracticable.

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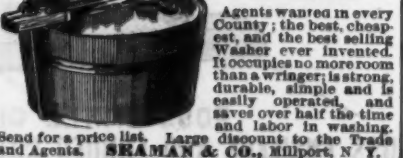


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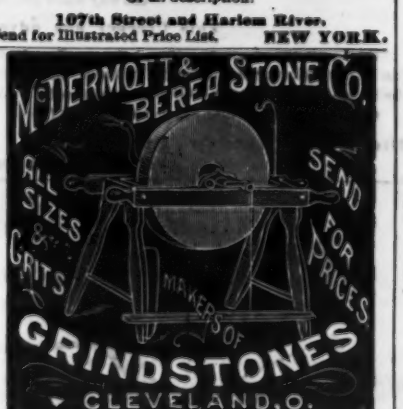


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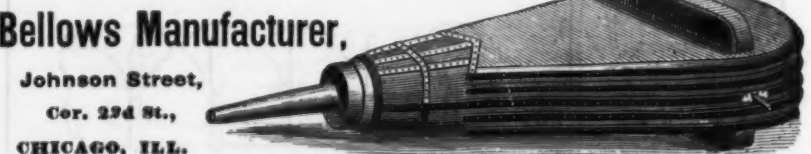
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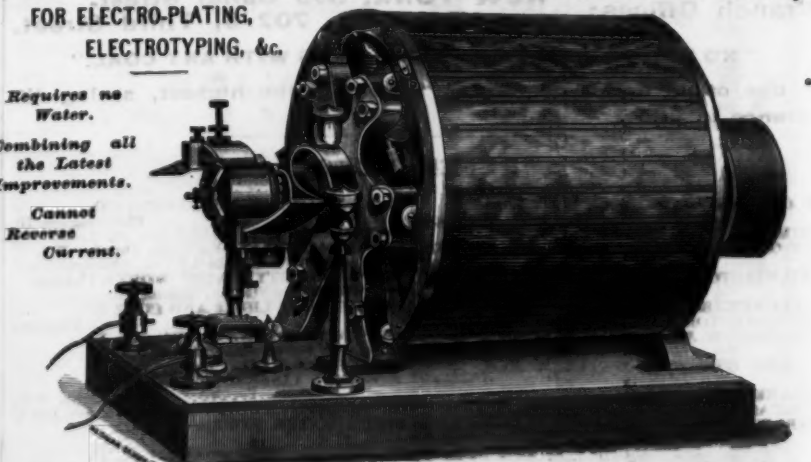


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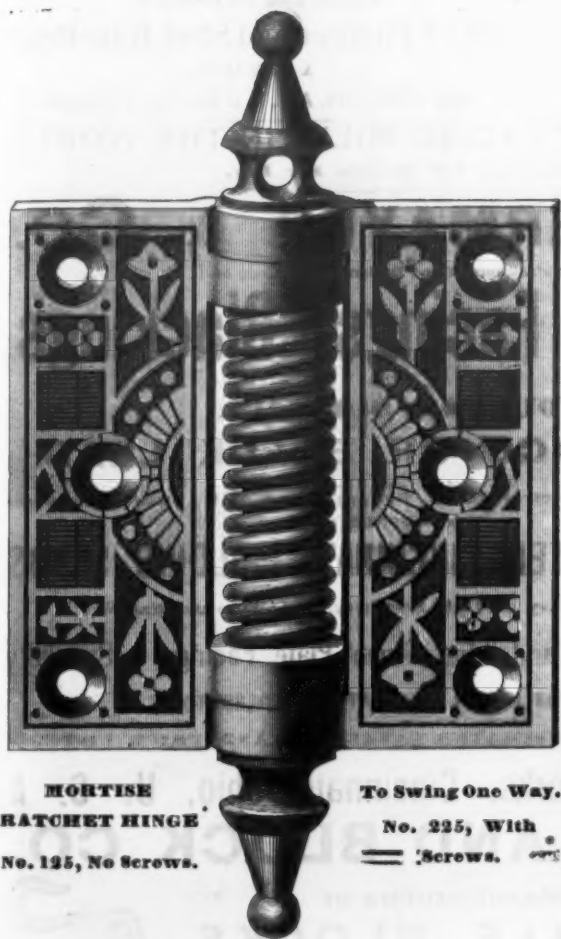
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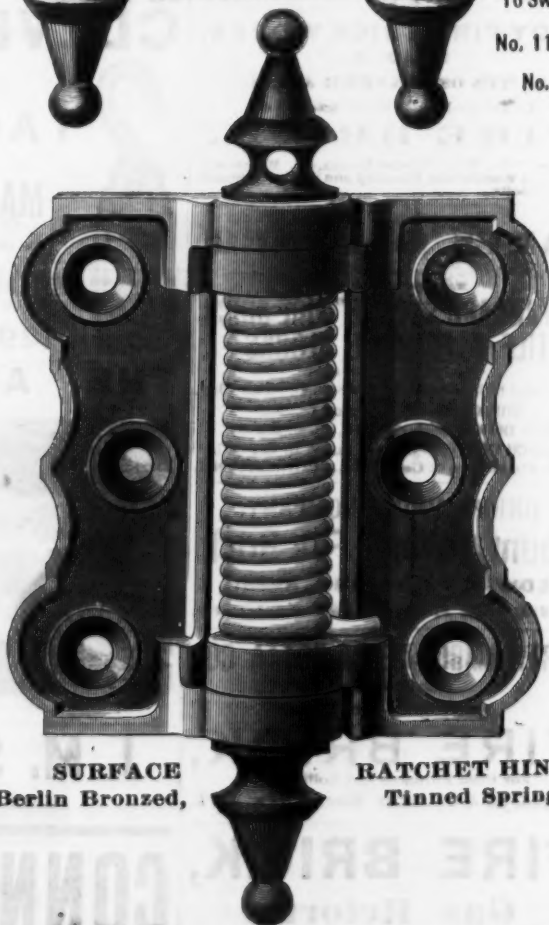


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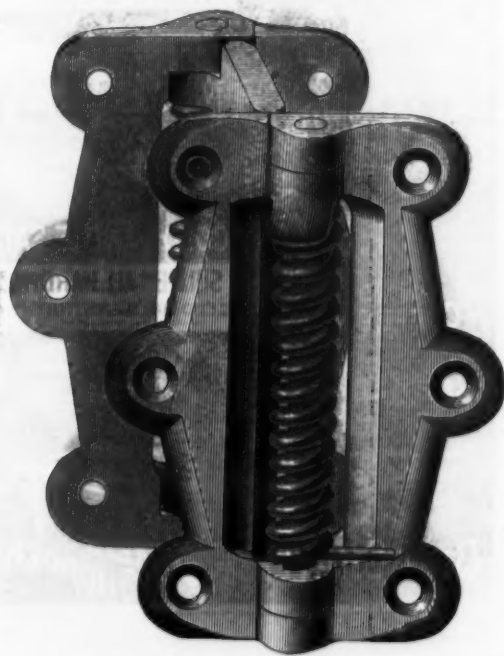
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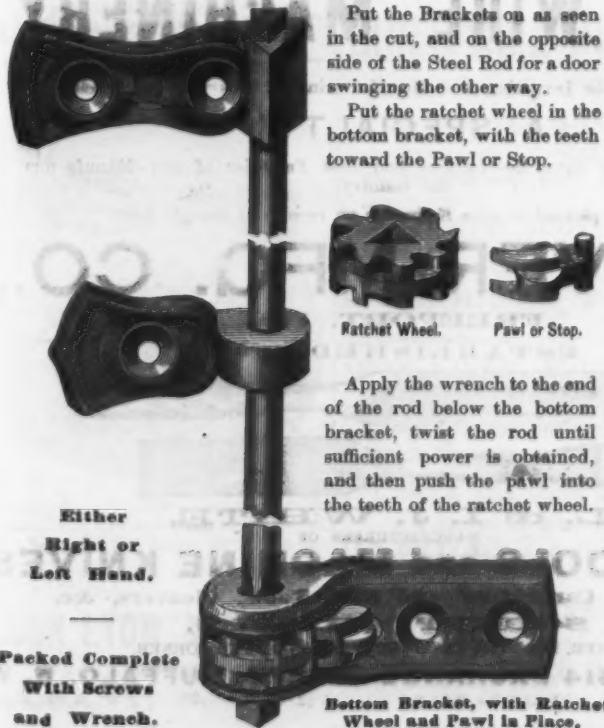
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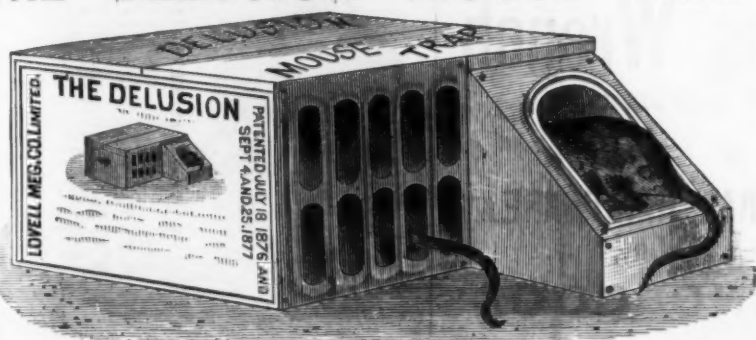
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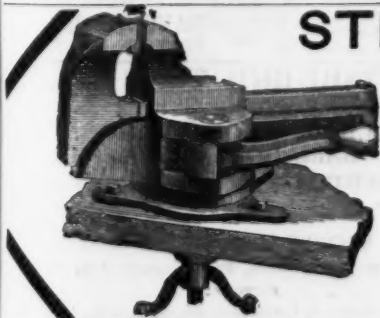
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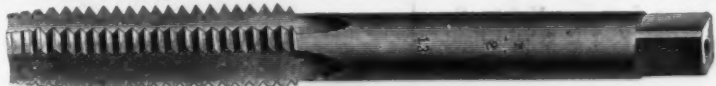


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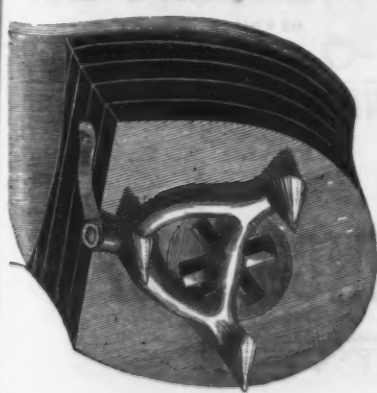
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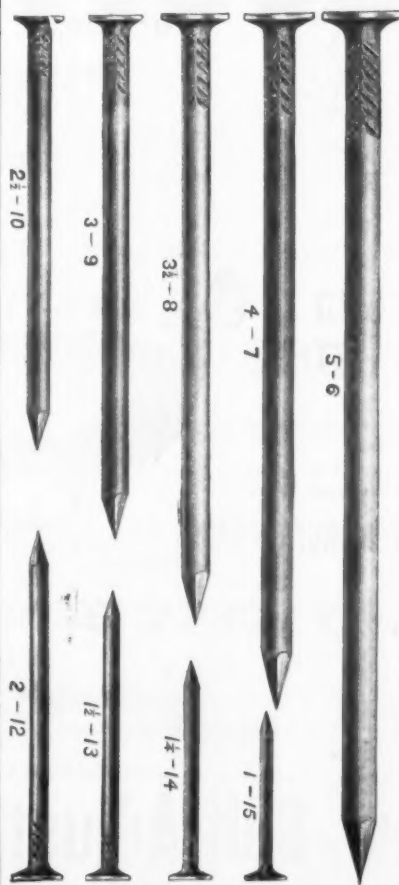


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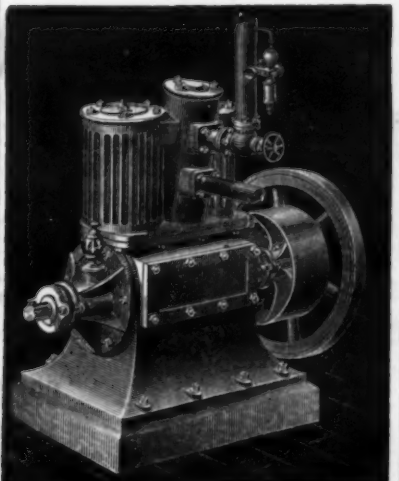
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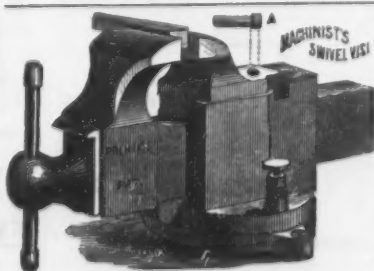
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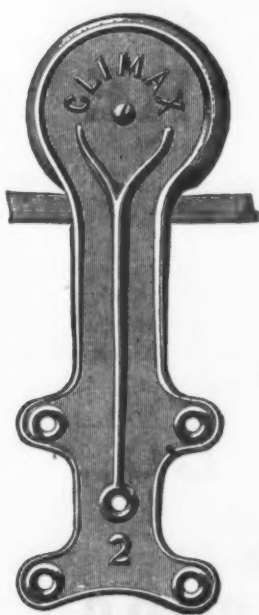
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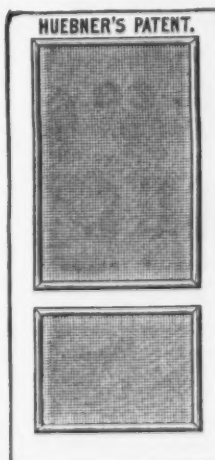
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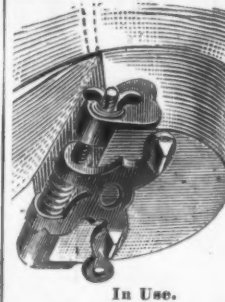
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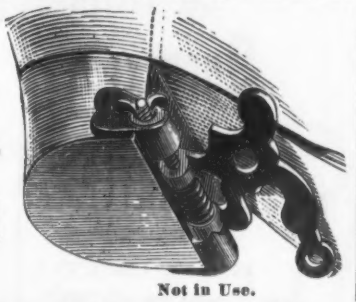
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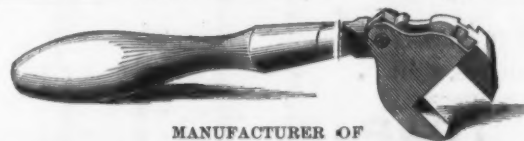
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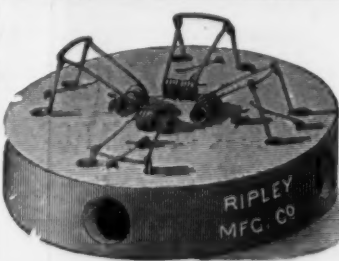
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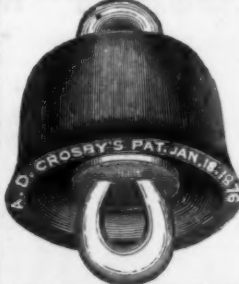
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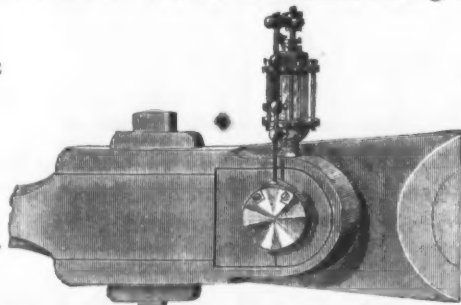
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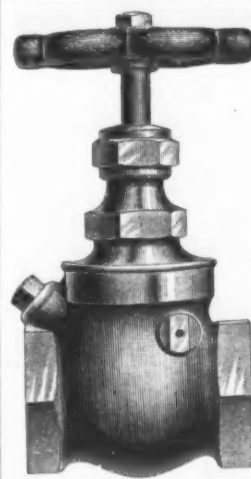
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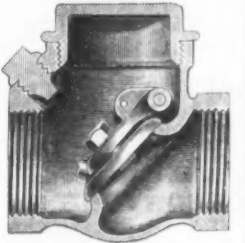
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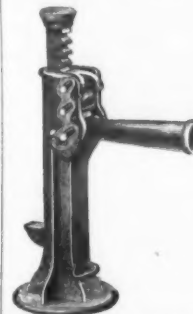
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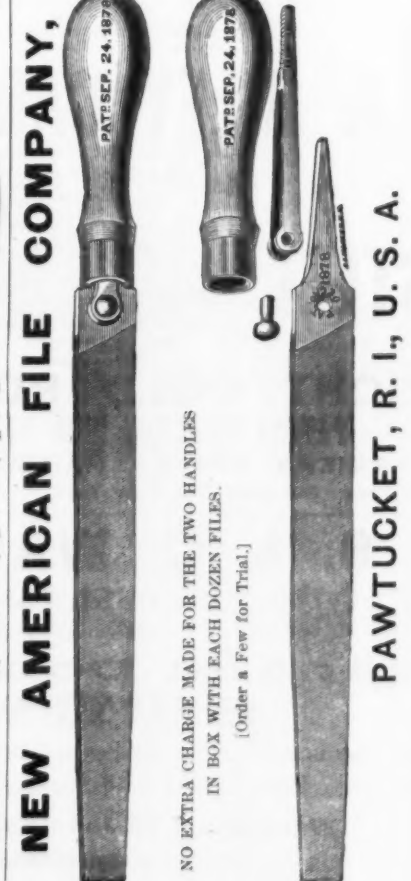
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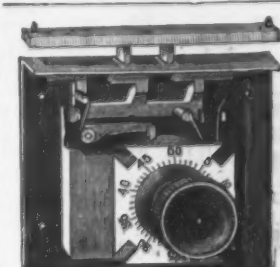
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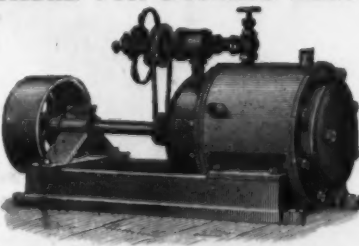
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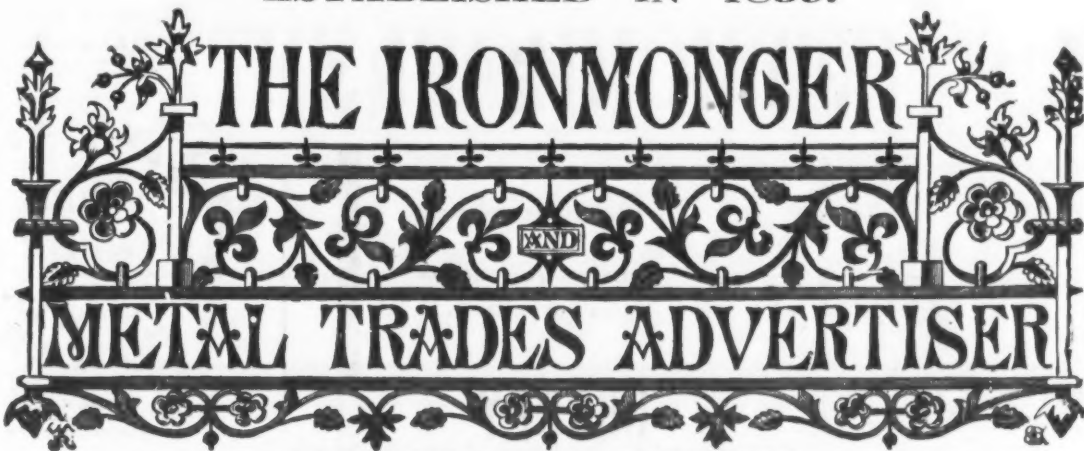
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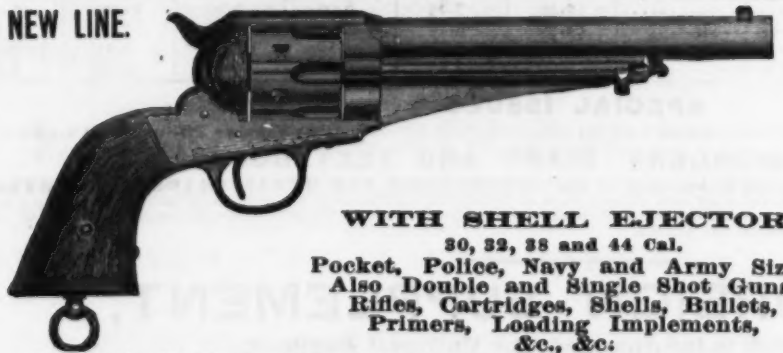
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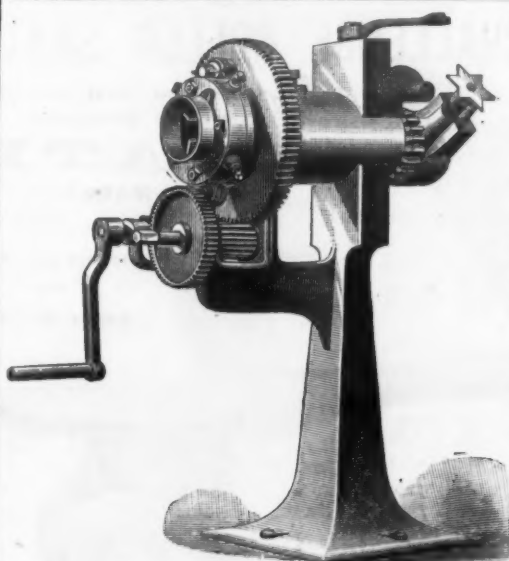
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Upright, without Augers.....\$1.00 to \$1.50
Angular, without Augers.....\$1.00 to \$1.50

Bolts.—Eastern Carriage Bolts.....\$1.00 to \$1.50
Philadelphia.....\$1.00 to \$1.50
Stanley, Wrought Shutter.....\$1.00 to \$1.50

Brass.—Barber's.....\$1.00 to \$1.50
Buckley.....\$1.00 to \$1.50
Buckley.....\$1.00 to \$1.50
American Ball.....\$1.00 to \$1.50

Butts.—Cast Fast Joint, Narrow.....\$1.00 to \$1.50
Broad.....\$1.00 to \$1.50
Cast Loose Joint, Narrow.....\$1.00 to \$1.50
Broad.....\$1.00 to \$1.50
Acorn Loose Pin.....\$1.00 to \$1.50
Maver's Loose Joint.....\$1.00 to \$1.50
Wrought Loose Pin.....\$1.00 to \$1.50
Table Hinges and Back Flaps.....\$1.00 to \$1.50
Narrow Fast.....\$1.00 to \$1.50
Loose Joint.....\$1.00 to \$1.50

Clad Butts.
Clark.....\$1.00 to \$1.50
Shepard.....\$1.00 to \$1.50
Lull & Porter.....\$1.00 to \$1.50
Butler.....\$1.00 to \$1.50
Chains.—German Hailer and Coll. list December 31, 1883.....\$1.00 to \$1.50
Galvanized Pump.....\$1.00 to \$1.50
Best Proof Oil Chain—English.....\$1.00 to \$1.50
Best Proof Oil Chain—English.....\$1.00 to \$1.50

Chisels.—Socket Framing.....\$1.00 to \$1.50
Socket Firmer.....\$1.00 to \$1.50
Butcher's.....\$1.00 to \$1.50
Casters.—Bed (new list July 1, 1883).....\$1.00 to \$1.50
Coffee Mills.—Box and Side, new list Jan. 1, 1884.....\$1.00 to \$1.50
Enterprise.....\$1.00 to \$1.50
Cutlery.—Walden Pocket, new list net.....\$1.00 to \$1.50
Penna. Knife Co., new list net.....\$1.00 to \$1.50
Landers, Fry & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co., Meriden Cutlery Co., Manufacturers' prices net

Drawing Knives.
Hart Mfg. Co.....\$1.00 to \$1.50
Adjustable Hand.....\$1.00 to \$1.50
Fry Pans.....\$1.00 to \$1.50
Burnished.....\$1.00 to \$1.50
\$ doz. \$5.00 3.75 4.00 7.00 8.00 9.00
Yo.....\$1.00 to \$1.50

Files.
Nicholson.....\$1.00 to \$1.50
Dixon.....\$1.00 to \$1.50
Butcher.....\$1.00 to \$1.50
Fluting Machines.....\$1.00 to \$1.50
Eagle.....\$1.00 to \$1.50
Crown.....\$1.00 to \$1.50
Globe.....\$1.00 to \$1.50
Vulcan.....\$1.00 to \$1.50
Ausable.....\$1.00 to \$1.50

Generators.
Yerkes & Plumb, new list.....\$1.00 to \$1.50
Mayday Hammer.....\$1.00 to \$1.50
Howell A. S. Nail Hammer, per doz. net \$2.75

Handles.
Dixon Loop Handles Crosscut.....\$1.00 to \$1.50
Yerkes & Plumb, new list.....\$1.00 to \$1.50
Hinges.....\$1.00 to \$1.50
Strap and T.....\$1.00 to \$1.50
Horse Nails.....\$1.00 to \$1.50
Globe.....\$1.00 to \$1.50
Vulcan.....\$1.00 to \$1.50
Ausable.....\$1.00 to \$1.50

Hay and Straw Knives.
Lightning.....\$1.00 to \$1.50
Wadsworth.....\$1.00 to \$1.50
Walton Straws.....\$1.00 to \$1.50
Locks and Keys.....\$1.00 to \$1.50
Stanford.....\$1.00 to \$1.50
Gaylor Cabinet.....\$1.00 to \$1.50
American Padlocks.....\$1.00 to \$1.50
Scandinavian Padlocks.....\$1.00 to \$1.50
No.....\$1.00 to \$1.50
No.....\$1.00 to \$1.50
No.....\$1.00 to \$1.50

Lanterns.
Rucker.....\$1.00 to \$1.50
Tubular.....\$1.00 to \$1.50
Guard, accents extra.....\$1.00 to \$1.50
Lawn Mowers.—Pennsylvania.....\$1.00 to \$1.50
Evelsior.....\$1.00 to \$1.50
Holland Patent.....\$1.00 to \$1.50
Machetes.....\$1.00 to \$1.50
Long and Short Cutters.....\$1.00 to \$1.50
Pennsylvania Pattern.....\$1.00 to \$1.50

Meat Cutters.
Dixon's.....\$1.00 to \$1.50
Woodruff.....\$1.00 to \$1.50
Stowe.....\$1.00 to \$1.50
Hale's.....\$1.00 to \$1.50
American.....\$1.00 to \$1.50
Stuffer.....\$1.00 to \$1.50
Enterprise.....\$1.00 to \$1.50
Rebbling Gales.....\$1.00 to \$1.50
Lincoln's.....\$1.00 to \$1.50
Landers, Fry & Clark's Petroleum.....\$1.00 to \$1.50
Brass Liquor Cocks, new list Jan. 1, 1884.....\$1.00 to \$1.50
Cork Lined.....\$1.00 to \$1.50

Meat Cutters.
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Landers, Fry & Clark's Petroleum.....\$1.00 to \$1.50
Brass Liquor Cocks, new list Jan. 1, 1884.....\$1.00 to \$1.50
Cork Lined.....\$1.00 to \$1.50

Round Head Brass.
Round Head Iron.....\$1.00 to \$1.50
Plated.....\$1.00 to \$1.50
German Silver.....\$1.00 to \$1.50
Britannia, Boardman's.....\$1.00 to \$1.50
Parker's.....\$1.00 to \$1.50
Tinned.....\$1.00 to \$1.50
Spring.....\$1.00 to \$1.50
Gem No. 3 small Jap'd.....\$1.00 to \$1.50
No. 2 medium Jap'd.....\$1.00 to \$1.50
Coll. No. 12, per gross net.....\$1.00 to \$1.50
Other Standard Springs.....\$1.00 to \$1.50
Warner Door Springs, per doz. net.....\$1.00 to \$1.50
Standard Spring Hinges.....\$1.00 to \$1.50
Single No. 6, per doz. net.....\$1.00 to \$1.50
No. 1.....\$1.00 to \$1.50
Other Standard Spring Hinges.....\$1.00 to \$1.50
Hicks and Viles.....\$1.00 to \$1.50
Steve Polish, Gem.....\$1.00 to \$1.50
Dixon.....\$1.00 to \$1.50
Fire Fly.....\$1.00 to \$1.50
Tacks.....\$1.00 to \$1.50
Shoe Nails—4, 5, and over 5.....\$1.00 to \$1.50
Double Pointed Tacks.....\$1.00 to \$1.50
Traps.....\$1.00 to \$1.50
Genuine Onoda—Newhouse.....\$1.00 to \$1.50
Onoda—Newhouse list.....\$1.00 to \$1.50
Vices.—Solid Box, Trenton new list.....\$1.00 to \$1.50
Wrenches.—Agricultural.....\$1.00 to \$1.50
Cope's Mechanics.....\$1.00 to \$1.50
Wire.....\$1.00 to \$1.50
Bright or Ann'd. No. 10 to 18.....\$1.00 to \$1.50
No. 10 to 18.....\$1.00 to \$1.50
Coppered, 10 to 18.....\$1.00 to \$1.50
Tinned Broom Wire.....\$1.00 to \$1.50
Galvanized Barb Wire.....\$1.00 to \$1.50
Painted Barb Wire.....\$1.00 to \$1.50
Galvanized No. 10 to 18.....\$1.00 to \$1.50
Wringers.....\$1.00 to \$1.50
Feetless No. 14.....\$1.00 to \$1.50
Universal No. 24.....\$1.00 to \$1.50
Novelty No. 2, for common use.....\$1.00 to \$1.50
No. 5.....\$1.00 to \$1.50
Explosive 2, for stationary tubs.....\$1.00 to \$1.50
In lots of 1 doz. \$6.00 doz. dis. from above price

PITTSBURGH.

Merchant Iron.
TERMS.—Note or acceptance at 60 days, with current rate of exchange on New York, or a discount of 2 per cent. for cash, if remitted within 10 days from date of invoice.

For fluctuations and discounts on card rates see weekly Pittsburgh Trade Report.
The following are card rates.

Flat Bar.
1/4 to 1/2 by 1/4 to 1 inch.....\$1.00 to \$1.50
1/2 to 1 by 1/4 to 1 inch.....\$1.00 to \$1.50
1 to 2 by 1/4 to 1 inch.....\$1.00 to \$1.50
1 to 2 by 1/2 to 1 inch.....\$1.00 to \$1.50
1 to 2 by 1 to 2 inch.....\$1.00 to \$1.50
1 to 2 by 1 1/2 to 2 inch.....\$1.00 to \$1.50
1 to 2 by 2 to 3 inch.....\$1.00 to \$1.50
1 to 2 by 3 to 4 inch.....\$1.00 to \$1.50
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1 to 2 by 99 to 100 inch.....\$1.00 to \$1.50

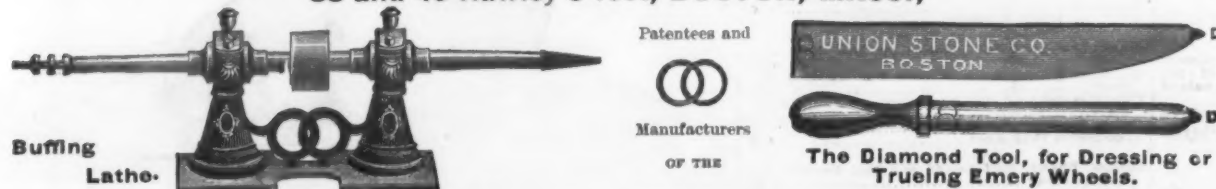
Half Oval and Half Round.
1/4 to 1/2 by 1/4 to 1 inch.....\$1.00 to \$1.50
1/2 to 1 by 1/4 to 1 inch.....\$1.00 to \$1.50
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1 to 2 by 68 to 69 inch.....\$1.00 to \$1.50
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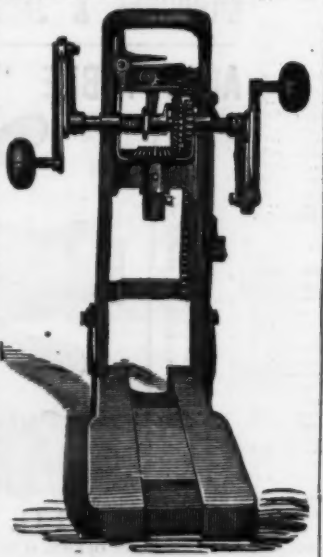


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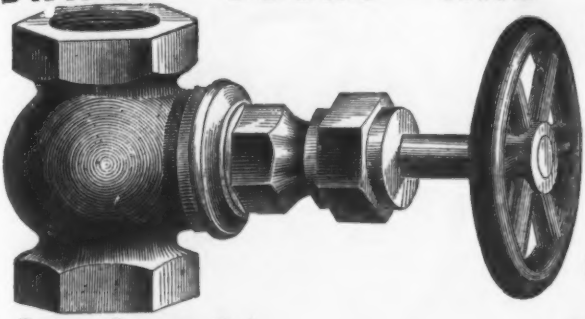
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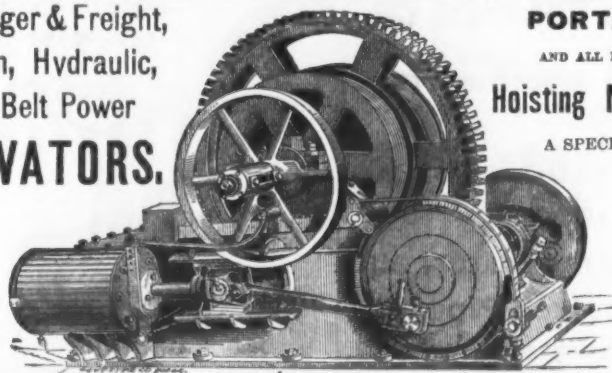
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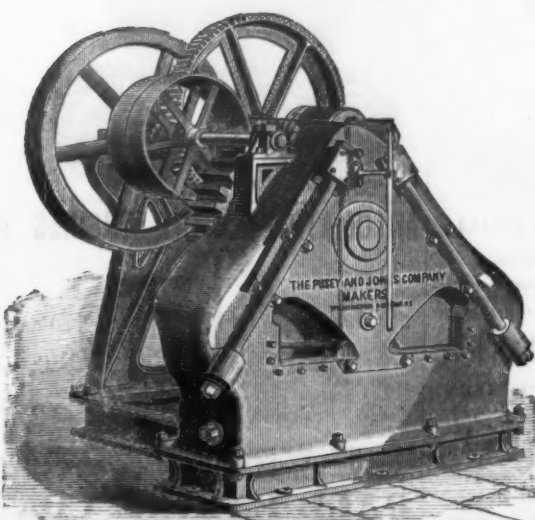
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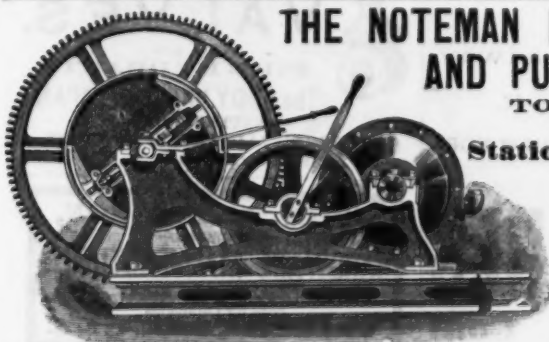
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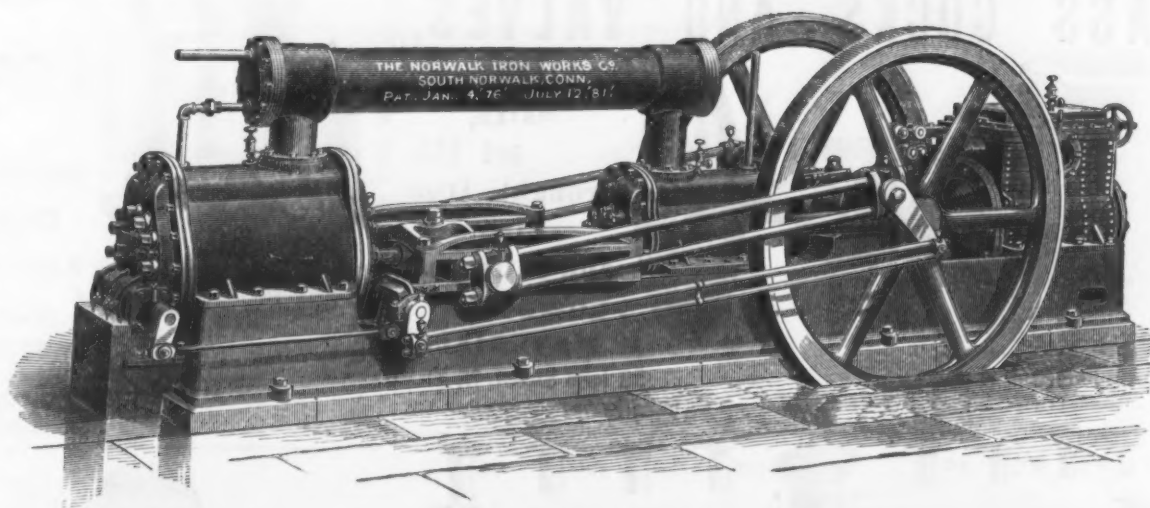
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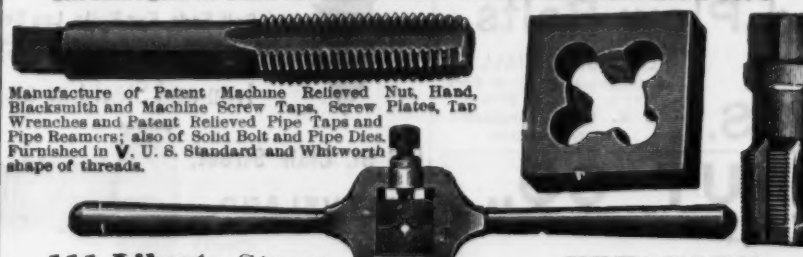
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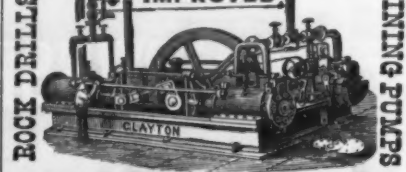
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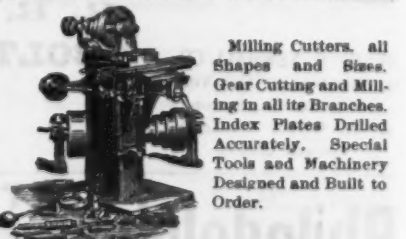
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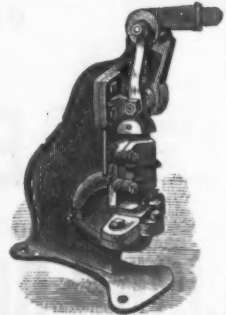
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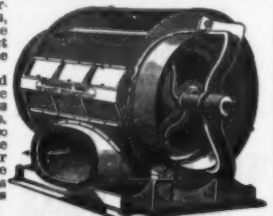
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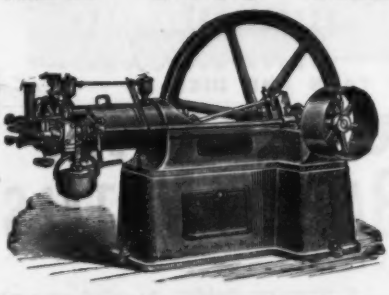
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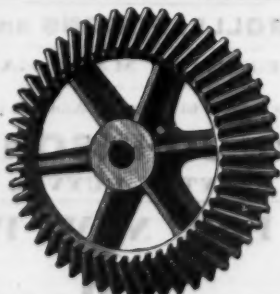
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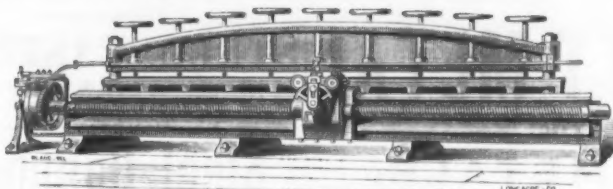
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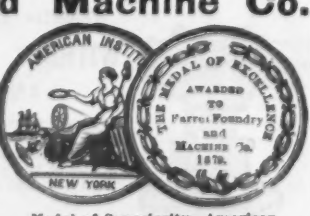
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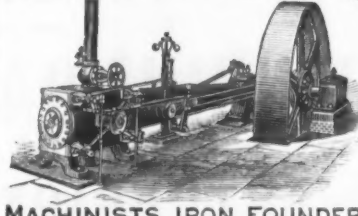
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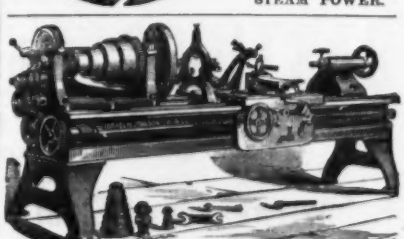
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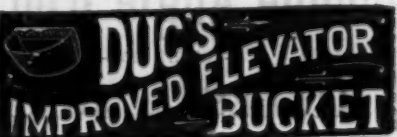
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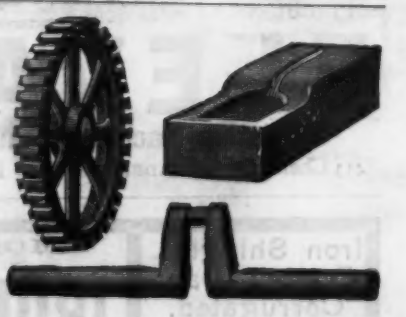
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